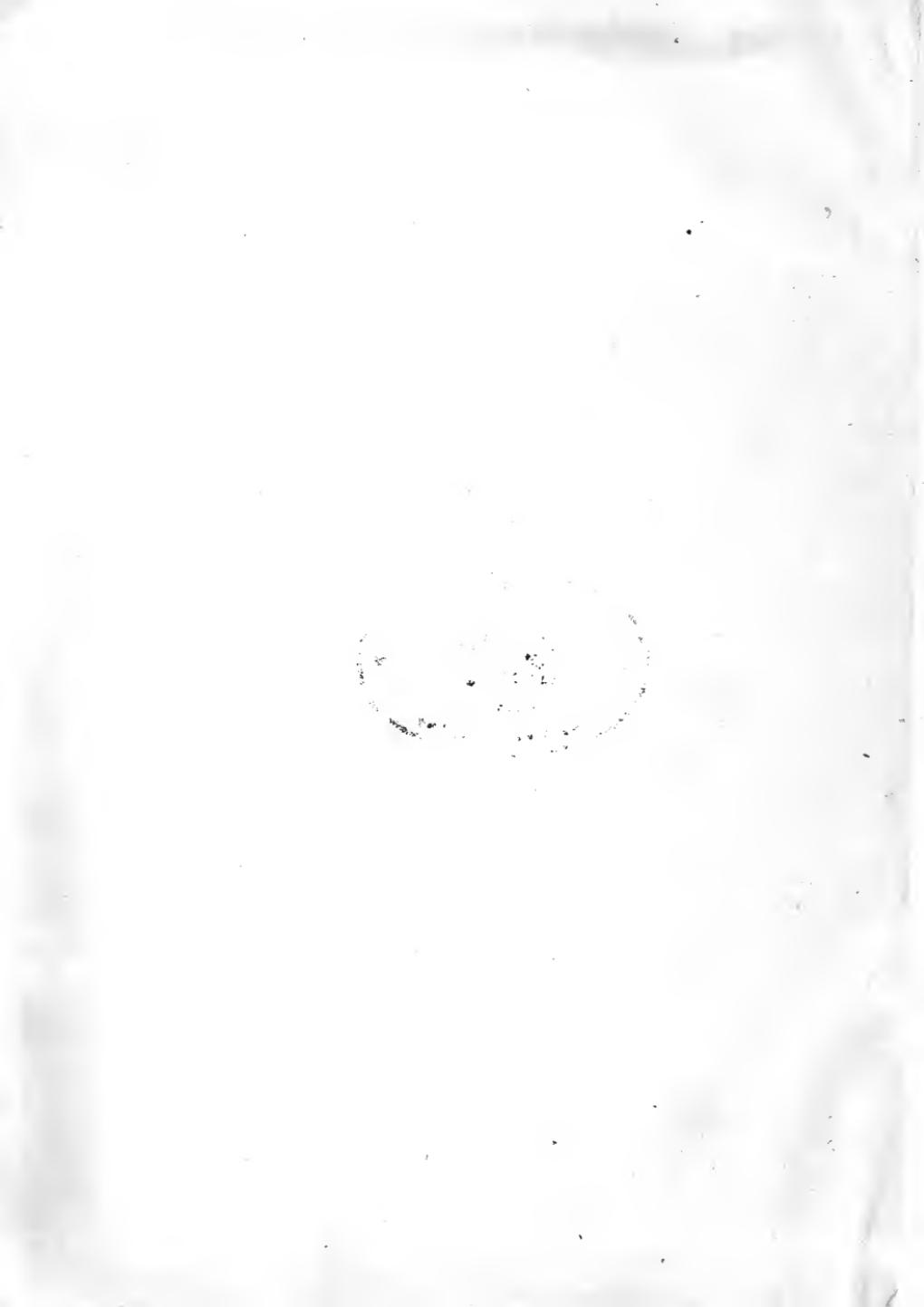


Richard Clark Esq.  
Chamberlain of London.

B I  
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Rare Book Room

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PHOCÆNA,  
OR THE  
ANATOMY  
OF A  
PORPESS,

DISSECTED AT

Gresham Colledge:

WITH A

Præliminary Discourse concerning  
Anatomy, and a Natural Histo-  
ry of ANIMALS.

---

*The World was made to be inhabited by Beasts, but studied and  
contemplated by Man: 'tis the Debt of our Reason we owe unto  
God, and the Homage we pay him for not being Beasts.*

Religio Medici.

---

LONDON,

Printed for Benj. Tooke at the Ship in St. Paul's Church-



# THE Explication of the Figures.

Tabula 1.

Figura 1.

**H**Ere is given the lateral prospect of this Fish, drawn from the life, and more exact than those figures of Bellonius, Rondeletius, Jonston, Jo. Dan. Major, or any I have yet seen. We may here observe the shape of the Body, its Color and Spottings, the site and proportion of its Fins and Tail, the Eyes, the Mouth, the Spiraculum or Spout, and at (a) the Rima of the Teats and at (bb) that of the Pudendum.

Fig. 2.

In the second figure is represented the Fish opened, and the Viscera of the Abdomen taken out.

AAAA. The Skin and Fat.

BB. The Os Hyoides which is mistaken by Dan. Major for the Os Sterni.

C. The Thymus.

d. The Sternum.

eeee. The Ribs.

f. The Diaphragme.

G G. On the left side are represented several tendinous fibres of the Musculus Psoas, and Diaphragme.

H. On the right side are shewn the curious Anastomoses of blood-vessels of the Membrane investing the Musculus Psoas.

Fig. 3.

In this figure is shewn the Tongue, the Larynx and Lungs.

A. The Tongue which is thick and serrated at the edges.

aa. Small Papillæ or Eminences at the root of the Tongue.

B. The Larynx which is very protuberating.

CC. The two Lobes of the Lungs.

D. The Gula or Oesophagus.

E. The Great Arterie, or Arteria Aorta.

Fig. 4.

Represents the Mouth of the Larynx opened.

a. The Rimula.

# The Explication of the Figures.

Fig. 5.

This figure represents the Larynx and its several Cartilages more distinct.

A. The Cartilago Annularis or Cricoides.

B. The Cartilago Scutiformis or Thyroides.

C. The Cartilago Arytanoïdes.

DDD. The Epiglottis.

Fig. 6.

In this figure the three Ventricles or Stomachs which are opened to shew their inward Tunics, as also the Pancreas, and part of the Omentum, are represented.

A. The inside of the first Stomach.

B. Several large Rugæ or Plieæ placed about the Passage from the first stomach to the second.

C. The second stomach.

D. The Passage out of the second stomach into the third.

E. The third stomach.

f. The Pylorus.

g. Part of the Duodenum.

H. The Pancreas.

i. The entrance of the Ductus Pancreaticus.

K. One of those Glandulæ both of which is supposed to be the

L. Part of the Omentum fastened to the stomach.

m m m m. Large blood-vessels curiously ramified in the Omentum.

n n n. Curious small fibres filling up the Interstices of the blood-vessels, and rendering the whole structure of the Omentum reticular.

Tabula 2.

Fig. 1.

This figure does represent the several tendinous fibres of the Abdominal Muscles which running in various Manipuli, and being curiously interwoven, do make the Linea alba which is here very broad.

Fig. 2.

Here is shewn the figure of the Liver.

A. That part which was in the right Hypochondri.

B. That in the left.

CC. The Ligamentum Suspensorium.

d. The Vena Umbilicalis.

Fig. 3.

The Glandulæ Renales, the Kidneys, Ureters and Bladder, and the various Organs of Generation.

# The Explication of the Figures.

ration belonging to the females,  
are delineated in this figure.

A. The vena Cava.

BB. The Glandulæ Renales,  
or Capsulæ Atrabilares.

CC. The two Kidneys, which  
consist of abundance of small Kid-  
neys conglomérated together.

dd. The Ureters.

EE. The Bladder or Vesica  
Urinaria.

ff. The two Arteriae Umbili-  
cales.

G. The Pudendum.

h. The Clitoris according to  
Dan. Major.

ii. The two Teats.

K. The Anus.

L. The Uterus or Womb.

NN. The Cornua Uteri.

oo. The Tubi Fallopiani.

P p. The Ovaria or Testiculi.

QQ. Muscular fibres that run  
to the Cornua Uteri.

SSS. Numerous Ramifications  
of blood-vessels that run to the  
Cornua Uteri, the Ovaria, &c.

TT. The Alæ Uteri.

VV. Part of the Peritonum.

Fig. 4.

Represents a single Kidney or  
one of those Glands cut in two, one  
part with a protuberance in the mid-  
dle, the other a cavity or hollow.

Fig. 5.

Represents the inside of the  
Glandula Renalis, cut horizon-  
tally.

Fig. 6.

The figure of the Heart, almost  
in its natural bigness; wherein  
may be seen the division of the  
Cone, the Auricles, the Arteria  
Pulmonalis, Aorta, &c.

Fig. 7.

Is a delineation of part of those  
bloud-vessels which compose that  
supposed Glandulous Body that  
lies on each side the Spine in the  
Thorax or Breast.

Fig. 8.

Are represented various parts  
belonging to the Fistula or Spout  
on the head.

A. The slit in the Skin, or out-  
ward Orifice of the fistula, which  
in its natural site was placed over

B B. The foramina of the  
Nares.

CC. Two Valves or Protuber-  
ances of the skin which cover part  
of the foramina.

DD. The first pair of Bags.

E. The common passage into  
the first pair of bags.

FF. The second pair of bags.

GG. Two Glands contained  
within the second pair of bags.

Fig. 9.

Does only represent the figure of  
the Slit or Orifice of the fistula or  
spiraculum in the Skin and the  
first pair of bags.

A. The Slit or Orifice of the  
Spout or fistula.

B B. The first pair of bags.

Fig.

# The Explication of the Figures.

## Fig. 10.

### The Explication of the Skeleton.

A. The upper Maxilla or Rostrum.

a a. The two holes of the fistula or Spout.

B. Several protuberances on the Os Frontis.

c c. Two pyramidal processes of two bones that compose part of the Spiraculum or Spout.

d. One of the outward bones of the Rostrum.

e. One of the inward bones of the Rostrum.

f. The os Zygomaticum.

g. A large eminence in the Cranium and the sutura Coronalis.

h. The sutura Lambdoidea.

i. The Teeth.

K. The lower Jaw.

m. The transverse process of the first vertebra of the neck call'd Atlas.

n. The Spinal process of the same Vertebra.

ooo. The Spinal processes of the other Vertebræ.

p p. Processes opposite to the Spinal processes consisting of two small bones, arising from the Cartilages that joyn the Vertebræ together.

Q. The Scapula. The bones of the fin are represented in the next figure.

rr. Two processes of the scapula.

SSS. The Ribs.

T. The Sternum.

## Fig. 11.

The Bones that compose the fore-fin are here delineated.

A. The os Humeri.

B. The Radius.

C. The Ulna.

d d. The Bones of the Carpus.

e e. The Bones of the Metacarpe.

fff. The Bones of the Digits.

## Fig. 12.

Represents the Anterior part of the os Petrosum or Ear-bone.

a. The Hollow leading to the Tympanum.

B. The Tympanum.

C. That part of the Ear-bone that lies in the Cranium.

D. That part which is without.

## Fig. 13.

Represents the posterior part of the os Petrosum or Ear-bone which here seems to be two bones.

a a. That part of the Ear-bone that represents a Cochlea.

B. A Cavity for receiving the Auditory Nerve.

C. A large Hollow that leads into the Cavity of the Ear and seems to render it two bones.

d d. That part of the Ear-bone which is very thick and solid.



To the HONOURABLE  
Sr. Joseph Williamson, Kt.  
President of the Royal Society ; and to the Council, and Fellows of the said Society.

SIR,

**T**HERE is no man that hath the free use of his Reason and Senses, with Opportunity, but must as naturally fall to Philosophizing ; as a Silk-worm that is full grown, and hath a convenient place, must fall to Spinning. But one whom the Royal Society hath so far honoured and obliged, as to make him of their Number ; how much less possible is it for him to live a Drone, and not to act his part in so industrious and noble a Hive ? As a Specimen of what I am willing more particularly to apply my self to, I here humbly offer the following Discourse to your acceptance.

## The Epistle Dedicatory.

And which I also do with some allowable boldness : Because upon a subject so suitable to your Design ; because, I am sure, I have at least heartily aimed at my Duty in the management of it : and because it was first drawn up, and is now published, not without your own favourable Aspect and good liking. And if, upon your review, it shall again meet with the same, I shall not only be buoyed up against any ill Reflections that may befall it ; but encourag'd to proceed in what I have begun : and to do all that one would do, who aspires to be in some measure useful, and to mankind.

Sir,

One of

Your most Obedient  
Servants,

Edw. Tyson.

Tabu

Fig. 1.



Fig. 2.

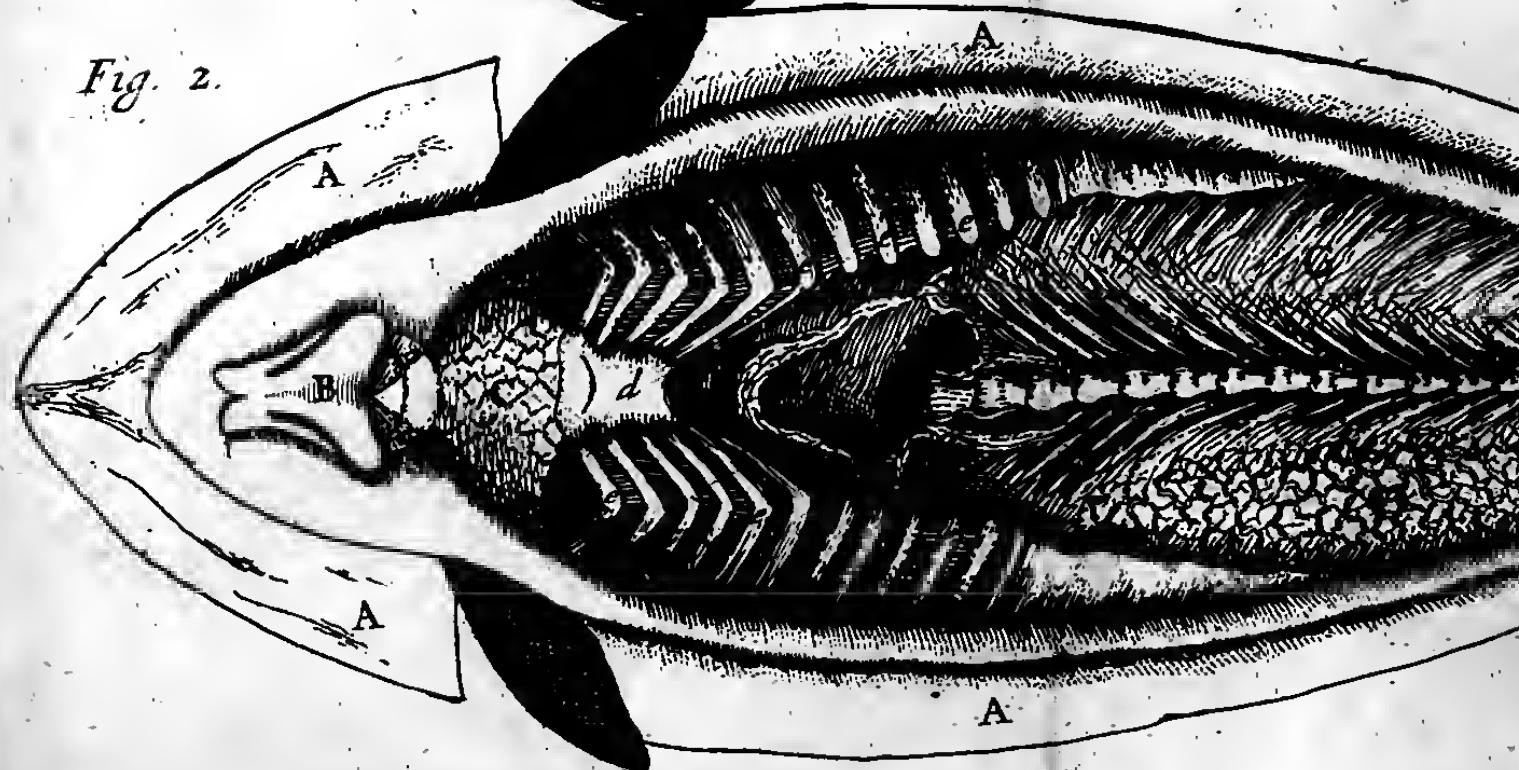


Fig. 3.

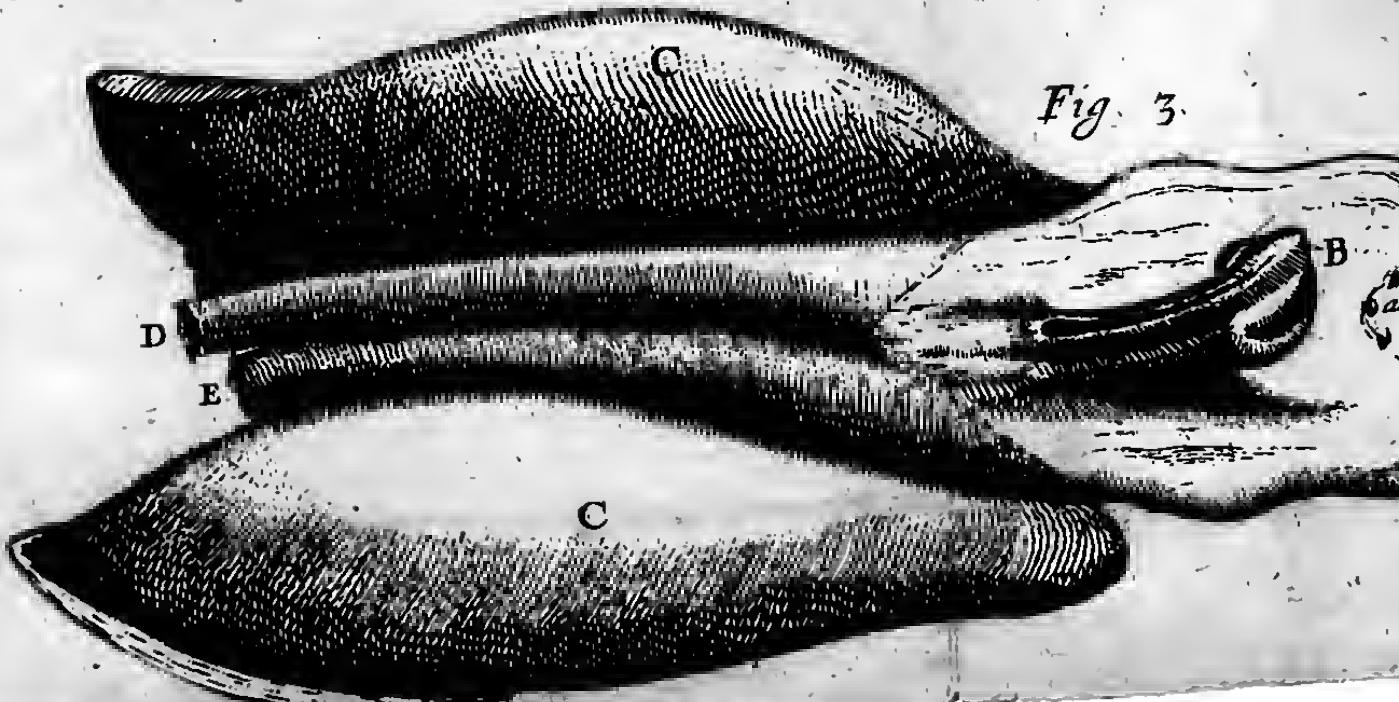


Fig. V.

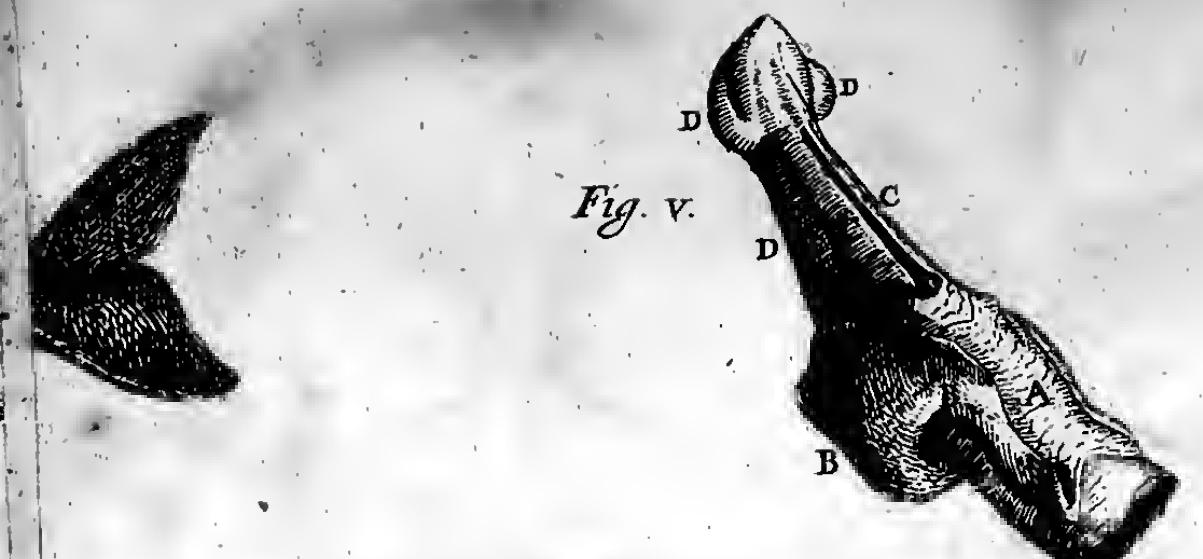
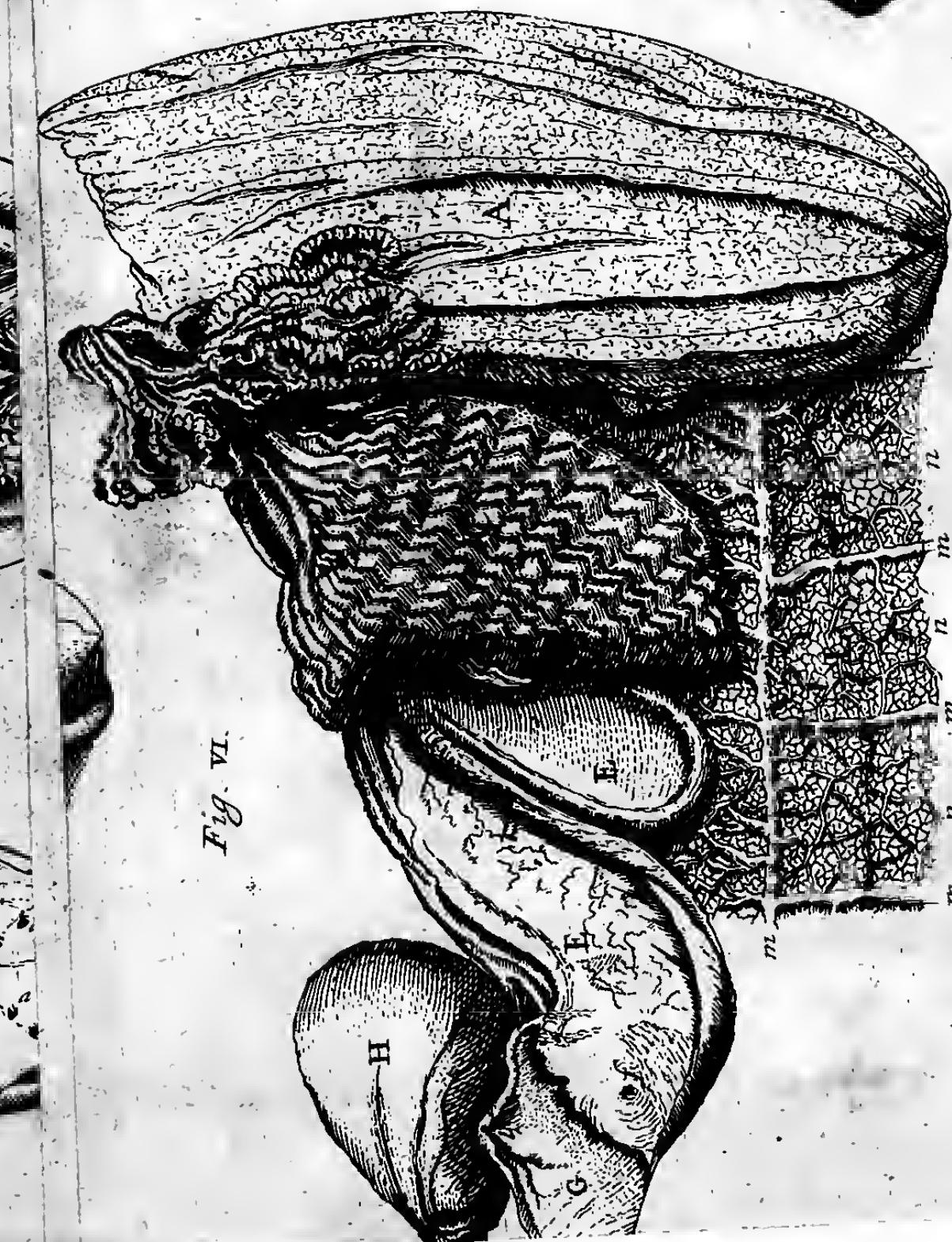
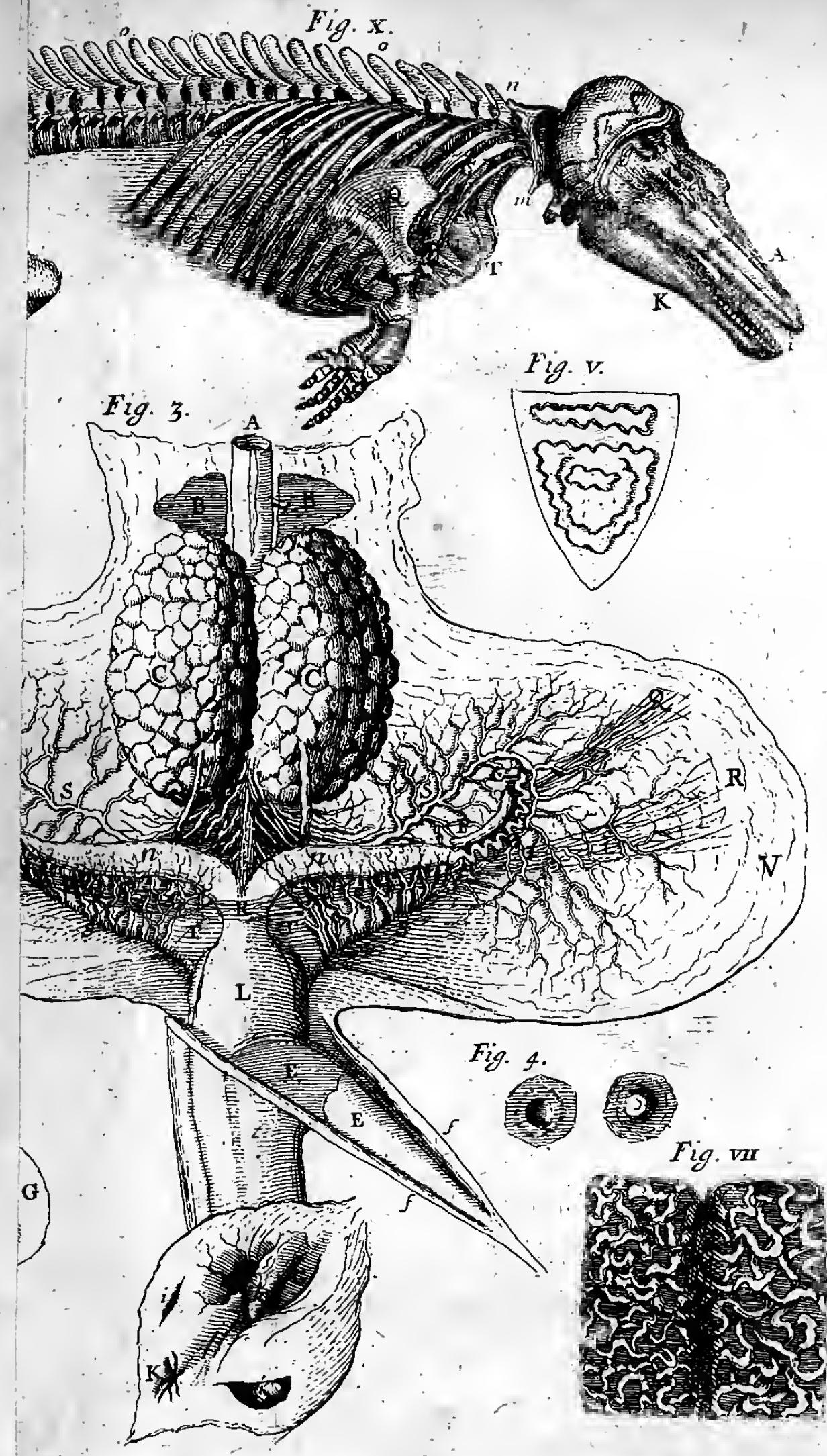
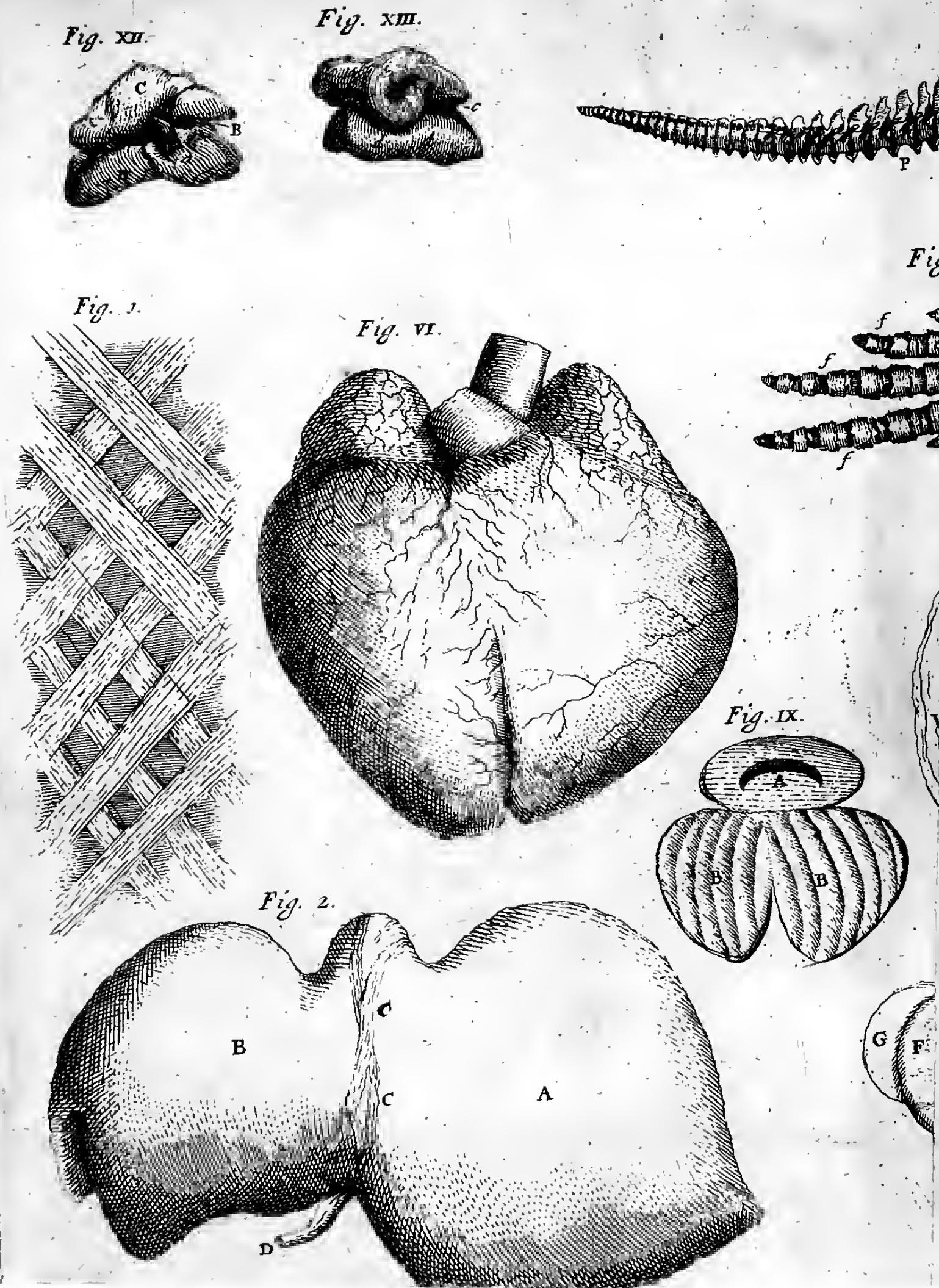


Fig. VI.





TAB. 2 <sup>da</sup>





A

# Preliminary Discourse

Concerning

## ANATOMY

AND A

## NATURAL HISTORY

OF

# ANIMALS.

Ince first I applyed my self to *Physick*, and had spent some time in the various studies thereof ; though each had its peculiar Charms, which allured and greatly delighted the Mind busied and employed therein ; yet that of *Anatomy* in a more extraordinary manner affected my Genius. The great and useful discoveries that of late have been made by it in the *Lesser World*, have equalled, if not exceeded those done by curious Adventurers and Saylers in the *Greater*. New *Tracts*, new *Lands*, new *Seas* are daily found out, and fresh descriptions of unknown Countreys still from both brought in ; so that we are forced to alter our *Maps*, and make anew the *Geography* of both again. Nor have the discoveries of the *Indies* more en-

## 2 A Preliminary Discourse concerning Anatomy

riched the world of old, than those of *Anatomy* now have improved both *Natural* and *Medical Science*: Nor can I tell how otherwise we can attain to that advice of the Oracle, *γνῶσθε οὐαντίν*, but by *Anatomy*. Natures *Synthetic* Method in the composure and structure of Animal Bodies, is best learn't by this *Analytic*; by taking to pieces this *Automaton*, and viewing asunder the several Parts, Wheels and Springs that give it life and motion.

*Physick* certainly must acknowledge *Anatomy* its best Cynosure; and that Pilot must needs err and wander, who without it, being ignorant of the various Seas and Coasts he fails in, steers all in the dark and at random: or if possibly it happens that sometimes he be cast into the desired Port or Haven; yet he is to be esteemed more fortunate than skilful. The dissection of *Morbid Bodies* affords the best account of *Diseases*; and often indicates the *cure* in others: that of *Sanous*, informs us of the true *texture* and *uses* of the parts. Both have their great advantages, both ought with equal Care and Sollicitousness to be cultivated. But since we must know what is the right, before we can understand the various deviations from that Rule; great and laborious have been the Researches both of the present and former Ages, for the attaining this: But in nothing have their endeavours been more successful than in making a *comparative survey*. Nature when more shy in one, hath more freely confess and shewn herself in another; and a Fly sometimes hath given greater light towards the true knowledge of the structure and the uses of the Parts in Humane Bodies, than an often repeated dissection of the same might have done. Hence it is that the great Improvers of this Learning have digged so much in these rich Mines, and have brought from thence so vast treasures; though they are still so far from exhausting them, or proclaiming Nature's Penury, that they cannot sufficiently extol her Bounty, or with too passionate a Zeal sollicit a farther prosecution of so great a work; which by their example and success therein.

therein, they have both credited and encouraged. We must not therefore think the meanest of the Creation vile or useless, since that in them in lively Characters (if we can but read) we may find the knowledge of a Deity and our selves. What often our inconsiderate Ignorance disregards and thinks but despicable, were there a just scrutiny made, it could not but excite our greatest admiration, and extort a Confession of its admirable contrivance and workmanship. In every Animal there is a world of wonders ; each is a Microcosme or a world in it self : And that great Conquerour of the world, who wept that there was but one for his ambitious Rage to spoil, at length more nobly had his desires in these, and with greater Glory hath eterniz'd his Name, when after he had ravag'd the Air, Sea and Land, at last committed to *Aristotle* to write the History of his Trophies. The wisest of Kings and Men may be thought to have gained great part of his knowledge from them. Nor ever was there an Age so ignorant and Brutish, but in some measure or other hath endeavoured to bequeath to Posterity their Learning herein. Ours that hath so widely extended the *Pomæria* or former Boundaries of all good Learning, and with vast labour hath at last pulled down those *Herculean* Pillars, that too narrowly confined its Empire ; having vindicated its just Liberties from the Tyranny of usurping Authorities, and the Credulous slavery to some Great Names, does daily bring in its stores for the rearing a new and more lasting structure of Natural History. For impartially viewing the Buildings of the old, and finding in so many Places its foundations so weak and infirm, although many of its Materials may serve again, yet it has been thought more adviseable to pull it down and begin a new, than to repair the Ruines of so decrepit an Edifice. In so great a work many hands are daily employed, some in battering down and removing the Rubbish, others in endeavouring to lay a good foundation ; some dig for new stone, others labour in polishing it ; others in inventing new and more conve-

## 4 A Preliminary Discourse concerning Anatomy

nient Instruments and tools to work with ; some give their Pains, others their Purses ; all their desires and good wishes to so noble a design. But since it will be some time before we can expect so vast a Pile to be compleated ; great care must be had, that what is brought in, be preserved and secured either from the Injuries of the weather or times, or danger of being squandered away, and that all may be ready at hand when they come to have occasion of using it in raising this stately fabrick ; for the modelling and contriving of which the skilfullest Artists must be consulted with, though even the meanest in some things may give in their Informations. I shall therefore here propose a rude Draught or Sciagraphy of a *Natural History of Animals* ; such as hastily occurred to me ; not what may be done, or the thing requires, but what haply may afford some Hints to others.

In compiling therefore a *Natural History of Animals*, I have always thought that Ambition of some of writing an *Universal*, more Pompous than Instructive ; for the Method they have usually taken hath been to rake in all from former Authors, without separating the weeds, or sifting the chaff from the Grain : By this they have farther propagated many antiquated errors, without adding much new Truths to the stock themselves. But had they taken as much pains and travail in searching the *Books of Nature* as they have in those of *former Writers* ; and instead of giving us an account of Animals of *forraign Countreys* (which they could not observe) they had made a curious and strict Inquiry into those of *their own*, their accounts would have been more faithful and welcome, and they have deserved more for this Particular, than their universal History.

Νήμοι ἀδελφοί θεοντος πλέον οὐκέποι παῖς.

I could therefore wish we had a good History of the Animals of our own Countrey, and not like giddy Tra-

vellers ramble abroad to see fine things, and still remain ignorant of what we have at home. This History I could desire likewise might commence from the lowest degree of Animation in *Zoophyta*'s or *Plant-animals*; inquiring here into Nature's first Rudiments and obscurer *Vestigia* of forming the Organs of an Amphibious life in them; then gradually ascending by her clew to run through all the various Tribes of *Animals*; carefully observing all along the Harmony she keeps, or the Liberty she takes in the different formation of them, and from the whole to give a general Prospect of her workings.

The various tribes of Animals I may reckon *Insects*, *Reptiles*, *Fishes*, *Birds*, *Quadrupeds*, and the *Intermediate species*; and of these may be given

# An Account { Physiological. Anatomical. Medical.

The *Physiological Account* may contain

The Names { of } our own { Nations both { Antient  
Synonyma's { other } or { and Modern,

## Their general and external descriptions.

Their various species and subdivisions, and Characte-  
ristical marks.

## The Places they most frequent or are bred in.

The season when, and the time how long they live.

## Their way of Living, their Food, &c.

Any remarkable Observations relating to their sagacity, &c.

## The use and Benefit they afford to Man, &c.

for } Food, and the best way of ordering them.  
Cloathing.  
Mechanical uses, &c.

## 6 A Preliminary Discourse concerning Anatomy

The Injuries they do, how to be avoided or remedied.

The wayes of taking, preserving, propagating or destroying them.

Former Naturalists in their Histories have contented themselves with more or fewer of these Inquiries, in which yet they too too oft misguide us by their Accounts taken from unfaithful Relators, or the fabulous Records of the Antients ; nauseating and obscuring the whole by tedious Philological Harangues, or troublesome quotatations for the confronting or establishing the Opinions of some ; relying on others, when Autoplie, and their own Experience can only inform them ; and their Conscience and eyes may be as a thousand Witnesses. I cannot see how a Natural History of Animals can be writ without Zootomy ; at best their Accounts can be but superficial, and by them we may know a Pig from a Dog, or that this is a Bull, a Bear or Monky ; but still remain ignorant of the curious Contrivance and Mechanisme of Nature within ; just as if a person should think he had sufficiently described a Watch, when he had only taken notice of the Case, the Studs, the Glass, the figures and hand ; by this he may know it to be perhaps a Watch, but knows not how it so exactly measures time. This most necessary part therefore and most instructive,

The *Anatomical Account* may contain,

1. An accurate Dissection and Description of all the solid Parts, to be illustrated (where necessary) with Figures ; and herein to be mentioned not only their Site, Number, Figure, Colour, Magnitude, their Cavities, Vessels, Integuments, Substances, Ligaments, and Communications they have with other Parts, but likewise in some, a more strict scrutiny may be made into their utmost Textures, by unravelling the same, and by the assistances of Glasses and other Methods. Thus viewing Nature where she more plainly discovers herself, by the Logick of a fair Analogy we may conclude she works the same, where yet

her tracts are more obscure, and shuns the view of our most sollicitous Inquiry.

2. But since life and the whole *Oeconomia Animalis* consists chiefly in the *Fluider* Parts of our Bodies; I have alwayes thought it a too narrow confinement of Anatomy, when restrained only to the search of the *Containing* Parts. The *Contained* likewise and *Fluids* are capable of an *Analysis*, if not by the knife, yet fire: and the various mixtures made of them with *Acids* and *Alkali's* of various sorts and consistencies; and observing thence the various Results of *Fermentations*, *Ebullitions*, *Coagulations*, alterations in *Colours*, and other Qualities, will afford abundance of curious and instructive speculations: and I would have not only a view to be made of all the Humours in each single subject, but upon the whole a Reflection to be made; and from such a stock of Experiments, we may warrant an Inference, and be more happy in our guesses about the uses of the Parts, and the Offices they perform in this Oeconomy.

3. The *Psychologia* likewise will here deserve to be considered. Sensation and Motion, and what other functions there are of the soul, by such a Comparative survey may be rendered more intelligible; and from a clearer knowledge of them in Brutes, at length we may come the better to know our selves.

4. Lastly, *Embryotomia* and the History of Generation. These as they will require a great deal of Labour in the Referch, so will they abundantly recompence the Pains by the great plenty they will afford of fruitful Observations. Nature viewed in her naked form, in the first organization of Animal Bodies, before she hath drawn over the veil of flesh, and obscured her first lines by the succeeding varnish of her last hand, more freely displays herself, and suffers us to behold the disjoyned Parts of this admirable Machine, and how it is that in time she puts them all together: this certainly will be of the greatest consequence both for the knowing the structure and the uses of the Parts..

## 8 A Preliminary Discourse concerning Anatomy

But that we may yet reap farther advantage from this disquisition, and render it serviceable for the Prolongation of Humane, as well as their own lives, I have added

The *Medical Account*, which may contain as well the Diseases they are most obnoxious to, with the History of Cures performed either by themselves, or the assistance of Others ; as also the *Copia* of Medicines that may be thence obtained, for the enriching and enlarging Pharmacy.

Physick, if we may believe the Antients, in its Infancy, took its Rise from Bruits ; they taught us the use of Clysters, Bleeding, Purging, Vomiting, the Sovereign vertues of Plants against Poysons, Hæmorrhagies, Wounds, Blindness, and almost the whole stock of all *Pandora's* Evils. And certainly were we but diligent in observing, our Reason might here learn a great deal, which Provident Nature hath taught them by Instinct to outdo us in.

Experience tells us, some Distempers sometimes are more happily cured in them, than in Men. Physick at first was but Empiricke ; success in one, encourag'd a tryal in another. I could therefore wish we had an History of Cures performed on Brutes. The Antient Physicians thought this study not below them ; hence 'tis we have the *Medicina Veterinaria*, *Mulo-Medicina*, *Hippiatria*, Ιερευστήριον, Οργανοστήριον, Κυνοστήριον, &c. By this we may not only preserve their Lives for our Profits or Pleasure ; but likewise be provided with further means of prolonging and lengthening our own.

Likewise on these Subjects when diseased, variety of Experiments may be tryed for the proof of the force of Medicines, for conquering the most stubborn distempers ; the causes of their ailments may be enquired into by Anatomy, and more daring attempts offered at, which at length by repeated success in them, may be essayed in Man. In short, there is no part of Physick but what may receive Improvements from them, there being not that difference between our Bodies and theirs, only our Intemperance

perance hath made us liable to a greater number of diseases.

As already they have furnished us with a great store of generous Medicines ; so I doubt not, but that if a strict search were made, we might easily augment the stock from them. I could therefore wish, that this likewise were prosecuted, and the best Methods of preparing and giving them were faithfully recorded.

Having run through these three Accounts, the *Physiological*, the *Anatomical* and *Medical*, a reflection upon the whole may be made ; and the *Pseudodoxia* or false Opinions of the Antients, and the *fabulous traditions* concerning them, may be taken notice of, rather by way of Catalogue than a larger Confutation.

But here it may be objected perhaps by some, That this design is too great to be effected, since a single subject so to be examined, will make a volume, and require some years, and the assistances of several heads and hands. But however slothful Ignorance may hence take a discouragement, yet nothing is insuperable to diligence and pains. But he certainly is to blame, who because he can't have all, grows full, and will have none. If what may, were but performed, such a stock would easily be added to by future diligence ; and far better a little with accurateness, than an heap of rubbish carelessly thrown together. *Malpighi* in his Silk-worm hath done more, than *Jonston* in his whole book of *Insects* ; and he and the Ingenious Dr. *Grew* have taught us far more of Plants, than either *Gerard* or *Parkinson*. Since therefore it requires so much Pains, Expence and Time, many hands must be engaged therein ; although it were to be desired, that some whose great Labours and Experience had rendred them more capable and expert, were more immediately concerned. Nor were it difficult, were there more *Alexanders* to find out *Aristotles*.

All Animals are not capable of all these heads of Inquiry, and several are so near a kin, that having fully described a *Genus*, the accidental differences of its various *species* would be soon absolved ; nor would there need a Repetition, but a bare Recital of the most remarkable discrepancies ; as the Anatomy of a *Porpois* might indifferently serve for a *Dolphin*, and most of the *Cetaceous* kind. I could therefore wish that at least for the present we had an Account of the most *Anomalous* and *Heteroclite* sorts of Animals ; or such whose *species* are most different. These Essays as they would animate Others to the Prosecution of the same, so likewise they would be a great help and assistance to them in the design. Something this way I may do perhaps my self ; and though I may not be so able or skilful as to hit the mark, or to catch the Game ; yet having raised it, and given the alarm to others, they may more successfully pursue it.

What is here performed in the Anatomy of a *Porpois* ; since 'tis but from a single Observation, and the first of the kind I had opportunity of dissecting, I cannot think it so exact or full, but that another or myself upon a review, might meet with mistakes, or make additions thereto. Which is but what I have here done to those Accounts given us already of the Anatomy of this Fish, by the famous *Rondeletius*, *Bartholine*, *Jo. Dan. Major*, and *Mr. Ray*. However had it not met with more favourable Censures than my own, it might have still enjoyed, what it best deserves, the silent confinement of my Study. But since it creeps abroad, I must here acknowledge the kindness of my most Ingenious Friend *Mr. Hook*, and those worthy Persons, who gave me the opportunity of making the Observation ; And his particular assisting me in design-

ing several of the figures, and other favours deserve my best Remembrance.

I shall only farther add, that we may here take notice of something of Nature's working, and gradual formation of the different Species of Animals; who like a curious Artist in designing the richest Tapistry, does not hastily pass from one extreme Colour to another; but curiously shadowing and intermixing the same, does give a greater Grace and Beauty to the whole. This is but what hath been formerly observed by that antient Christian Philosopher *Nemesius* in his *περὶ φύσεως Ἀνθρώπων* (p. m. 7.) where he tells us, ὁ γὰρ ἄνθροπὸς ἐκ τῆς κατὸς ἀλίτηρον τοινεν ἀπομνημένην αἰλιθίαν τὰς διαφόρας φύσεις, ὡς μήπερ εἶναι καὶ οὐγένειν τὰς πάσους κλίσις. Several instances he gives of this *amphibious* or Hermophroditical Nature of Animals and Natural Bodies; or as it were a Scale or Gradation of them; as first in *Zoophyta's*, then in the Testaceous Kind and Worms, then in more complete Brutes; after in such whose sagacity approaches the confines of Reason; at last in Man and Intelligent Beings, that are a boundary between Divinity and the Creation. What we have here is a signal Example of the same between Land-Quadrupeds and Fishes; for if we view a *Porpes* on the outside, there is nothing more than a fish; if we look within, there is nothing less. It cannot abide upon the Land so much as the *Phoca*, yet is often drowned in its own Element, and hath a constant need of the reciprocal motion of Air in Respiration. It is viviparous, does give suck, and hath all its Organs so contrived according to the standard of them in Land-Quadrupeds; that one would almost think it to be such, but that it lives in the Sea, and hath but two fore-fins. The Contrivance and Structure of several of its parts are most curious and admirable; much illustrating divers late Inventions

## 12 A Preliminary Discourse concerning Anatomy, &c.

of some, and affording good hints for making others. And certainly by carefully perusing these Books of Nature, we shall not squander away our time in trifles, but may expect to meet with what will both please and ravish the Phancy, inform the Judgement and enrich the mind with the knowledge of God in his works, and of our selves.

### E R R A T A.

Page 20. line 1. r. roundish : p. 21. l. 17. *Phia* r. *Plica* s. p. 24.  
l. 14. after it, insert *pallidius* : p. 42. l. 24. after *Tympanum*,  
add, *had a small bone that did arise upwards ; but part of it was  
broken off. We could not observe here either Incus, Stapes, or Malleolus,  
but to the Tympanum*.

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P H O

PHOCEANA,  
 OR THE  
 ANATOMY  
 OF A  
 PORPESS.

**T**HIS Fish by Aristotle is call'd *Phocæna*; by Pliny, and divers others *Tursio*; in English a *Porpess*, *quasi Porcus Piscis*, or Sea-hog; by the Germans *Marsuin*; in Latin often *Marsuinus*, i.e. *Maris Sus*; and in *Athenæus*, πορφύρα χεῖρ, and indeed in several particulars it so much resembles that terrestrial Animal, that this Name seems not improper, but much more justifiable than those of divers other Fishes taken from land Creatures.

'Tis placed generally by *Ichthyographers* amongst the Cetaceous kind, and reckoned a Species of Dolphins. (a) *Bellonius* gives several particulars both in the Internal and External parts, wherein the Dolphin and Porpess dif-

(a) *P. Bellon. de Aquatil. l. 1. p. m. 1.2.*

fer; but very much suspecting the truth of his Observations, I shall only take notice of one, mentioned by *Rondeletius*, *Aristotle* and *Bellonius* himself which is the *Rostrum* or Snout, which is much longer in the Dolphin than the Porpess, which is sufficient to distinguish them: and (b) *Ulysses Aldrovandus* does seem to make it the only distinction where he faith, *Quæcumq; etiam de Delphini utroq; sexu scripta sunt, Phocæna similiter convenient; & nisi Phocæna rostrum brevius haberet, Delphino fere undiquaq; similis foret.*

The \* figure of this Porpess we dissected was oblong, \* vid. Tab. I. Fig. I. its body roundish, its Head and *Rostrum* obtuse, the *Rictus* of its Mouth but small; it had two finns on the sides of its breast, one on its Back, and a semilunary tayle placed parallel to the *Horizon*, which in most other fishes but of this kind is vertical. The Aperture of its Eyes was but small. On the Head a little above the Eyes, it had a *fistula* or Spout arising from the Palate, which serves him for the drawing in Air for Respiration; as also for spouting out of water, as in the Cetaceous kind. On the Belly we observed the Place of the *Umbilicus*, and below that the † *Pudendum*, of each side of which were placed two † *Tab. I. bb.*  
\* Teats; below the *Pudendum* was the *Anus*. *Ibid. a.*

The Dimensions of its Body taken in the Decimal Measure of an Inch were as follows. From the tip of the Nose to the Extream of the Tayle was 412 decimals. Its greatest thickness, being at  $\frac{1}{3}$  from its Nose, was 82. The Girt of him in its biggest part was 250. At the beginning of its fins 230.

From the tip of the Nose to its Navel 180. to its *Anus* 300. to the Fin on the back 190. to the Fins on the breast 100. to the middle of the Spout 52. to its Eye 49.

The length or Aperture of its Eye 7. the distance

between the two Eyes in a straight line 52. from the hinder *Canthus* of the Eye to the *Porus Auditorius* was 17.

The length of the Mouth 30. the length of the outward *Rima* of the *Pudendum* 30. the length of those slits that were of each side, occasioned by the retraction of the teats, 7.

The length of the Fin of the back 40. the height of the same 27. the length of those on the Breast 70. the breadth 24. the distance between them 42. the spread of the Tayle 100. the broadest part near the Middle 37.

The whole weight of this fish was 96*l. aver du poiss*, that dissected by (c) *Daniel Major* weighed 124*l.* but (d) *Jonston* mentions, that in *Neustria* there was one taken that weighed 1000*l.*

The *Colour* of the upper half of the skin, that covered the Back, the Fins and Tayle was of a shining black; the rest very white: but on the sides a little above the fins, 'twas speckled of an Ash colour, or as *Major* expref-feth it, marbled by the mixture of both colours, into spots and streaks.

The *Skin* was perfectly smooth, without either hair or scales, which I suppose did very much advantage its swimming, and may be the reason we did not meet with those *foramina* on the head and sides which are frequent in scaly fish, and which, as (e) *Steno* hath well observed, do discharge an oyly substance, that serves for the lubricating the sides of the fish, and so renders them fitter for swimming; as our Watermen do commonly trim their boats, that they may the more easily glide on the water. However on the Nose of each side we observed two small holes that would only admit of a bristle.

(c) *Miscellan. Curiosa Med. Phys. Germanic. anni quarti Obsr. 20.* (d) *Jonston Hist. Nat. de Piscib. l. 5. p. m. 221.*  
(e) *Nich. Steno de Raiæ Anat. p. m. 55. & Canis Carcharæ diffo-  
lum cap. p. 93.*

*Bellonius*, *Rondeletius*, *Major*, and others do mention the *Meatus Auditorius* which we likewise observed at that distance from the Eye, as hath been expressed: 'tis extream small, and whether really perforated at the skin, we somewhat doubted; for forcing a small bristle into it, after it had entered, it readily descended towards the *os Petrosum*.

The figure of the Aperture of the \* *Spiraculum* or <sup>\* Tab. 2.</sup> Spout was somewhat semilunar: 'twas placed across <sup>fig. 9. A.</sup> the forehead just before the Brain, and was almost an Inch in length.

The shape of the *Back* was like the body of a Ship inverted, that were it not for its Fins and Tayle, it would easily turn downwards; but the contrivance is most convenient for swimming, by reason the water that is removed in swimming is that above them, which does most readily give way.

The Horizontal site of the *Tayle* in this fish is of great use. (f) Mr. *Ray* conceives it to be partly to supply the hindermost pair of Fins, which serve to ballance the body and keep it up in the water, answering in proportion to the hinder legs of a Quadruped; Hence we see that those fishes which have long Bodies, and but one pair of fins, as Eeles and the like, cannot keep themselves up in water, but lye always grovelling on the bottom: Partly to facilitate the fishes ascent to the top of the water (to which he can immediately raise himself by a light jerk of his tayle thus placed) for the use of Respiration, which is as necessary for him as for Quadrupeds.

The structure of the *viscera* and inward Parts have so great an Analogy and resemblance to those of Quadrupeds, that we find them here almost the same. The greatest difference from them seems to be in the external

(f) *Philos. Transact.* n. 76. p. 2275.

<sup>† Tab. 2.</sup>  
<sup>fig. x. &</sup>  
<sup>xi.</sup>

shape, and wanting feet. But here too we observed that when the skin and flesh was taken off, the + fore-fins did very well represent an Arm, there being the *Scapula*, an os *Humeri*, the *Ulna*, and *Radius*, the bones of the *Carpus*, the Metacarp, and 5 *digiti* curiously joyned ; the Tayle too does very well supply the defect of feet both in swimming as also leaping in the water, as if both hinder-feet were colligated into one, though it consisted not of articulated bones but rather Tendons and Cartilages.

The *Pudendum*, *Anus* and *Mamme* we shall describe when we come to those Parts to which they do belong. Next of all we shall take notice that the body was divided into three Regions or Venters, the Head, the Breast, and Abdomen. All of them had these common Integuments, a *Cuticula*, a *Cutis*, Fat, and a *Panniculus Musculofus*.

The *Cuticula* was a thin scarfe-skin, pretty easily separable by scraping with a knife from the *Cutis*. When any part was bent, 'twould wrinkle into exceeding small folds, but when unbent, 'twould readily return to its former smoothness.

The *Cutis* was  $\frac{1}{16}$  of an Inch thick, pretty easily vulnerable and flexible. Its Colour was the same throughout ; but where it was black, there on the innermost or concave part it was of the deepest colour.

\* Tab. I.  
fig. 2. aaaa.

The *Fat*, or as Mr. Ray calls it, the *Blubber*, was an Inch, or in some places more thick ; encompassing the whole \* body as in an Hog. It had a curious texture of fibres, which arising from the *Panniculus Musculofus* did decussate each other lattice-wise, and terminante in the Skin. Examining a small part of this Fat in a good Microscope, we observed it to consist of an admirable structure of numerous small cells or little bladders, in which was contained the Oyl ; so that upon cutting any part the Oyl would readily run out. The Fat therefore or Blubber in this fish was nothing else but Oyl contained in those Cells or bladders.

There are three uses Mr. *Ray* assigns to this part,  
 1. To keep the cold water at a distance from the bloud,  
 which in this Animal is hot, and by an immediate con-  
 tact would be apt to be chill'd. 2. To keep in the hot  
 steams of the bloud from evaporating. 3. Perhaps also  
 to lighten and counterpoise the body of the fish, which  
 would otherwise be too heavy to move and swim in the  
 water. *Bartholin* faith, that they make use of the Oyle  
 for Lamps.

The *Panniculus Carnosus* here was remarkable, consisting of muscular fibres, which were of a more florid red, than that of the Muscles. Its fibres from the back seemed obliquely ascending; but from the joyning of the *sternum* to the *Costa* and so proportionably on the *Abdomen*, descending obliquely and meeting at the *Linea alba*. I just now mentioned the fibres that did run from the *Panniculus* through the fat to the skin: the use of them may be, more firmly to hold to the skin, which if joyned only to the fat, would be much more easily separable. They may likewise give a Motion to the skin, as the *Panniculus Carnosus* does in Brutes. And lastly running through the Fat or blubber, they may very much strengthen the Cells or bladders.

The *Muscular flesh* of this Animal resembled not that of Fish, but rather Quadrupeds, being very Sanguineous, but of a dark red Colour. On the *Abdomen* we observed the *Musculi oblique ascendentes, oblique descendentes, transversales, & recti*. The tendons of the three former constituted the *Linea alba*, which was very broad and of a more curious but looser texture than usually; for we could easily perceive how they did run in several *Manipuli*, being interweaved and decussating each other as represented in *Fig. 1. Tab. 2.* The *Musculi Recti* were very thick and large; on the Inside we observed the *Vena* and *Arteria Mammaria* and *Hypogastrica*.

Under the Muscles of the *Abdomen* lies the *Peritoneum*, which is a thin though a double Membrane, in the dupli-  
 cature

\* Tab. 2. cature of which there lies the \* Bladder. Of each side fig. 3. EE. the Bladder there are fastened to the Peritoneum the two † ibid. PP. † Ovaria or Testicles, the Extreams of the || Cornua Uteri, as || n. also the Alæ Uteri. The numerous branches of large \* ib. sss. \* blood vessels that run to them, afforded a very pleasent † fff. sight. To the Navel were fastened the Vena & † Arte- riae Umbilicales, as in Quadrupeds.

(g) Bartholine and Jo. Dan. Major do both expressly deny that it hath any Omentum ; But in that which we dissected we observed a pretty large one ; but not extended over the Guts as in other Animals, but drawn up and lying loose between the Stomach and Intestines. 'Twas fastened to all the Stomachs, and received from them a great number of Sanguinary Vessels. It had its duplicature as in Quadrupeds, but no fat on it. Its whole texture seemed to be nothing else but an admirable Schematism or Network of Vessels and Fibres, which our naked Eye as well as Glasses could discover, and is in part represented in Fig. 6. Tab. 1. (h) Rondeletius does mention an Epiploum in Dolphins, as also does (i) Severinus in his Phoca, which he does describe to be without fat, which I rather think is natural, than, as he supposes, by a contabescence.

On the Omentum several Glandulous Bodies are fastened, \* a large round one growing thereon near the first stomach about the bigness of an ordinary Wallnut, being of a dark flesh Colour, and having a great many vessels common to it with the stomach, which Bartholine calls the *vasa brevia*. At a small distance from this are placed several other lesser ones, some of the bigness of an Hazel Nut, others of a Pea or Pepper Corn, in all in number about 10 or 12.

Where Mr. Ray does say the Spleen was small, and

(g) Tho. Bartholin. Histor. Anat. Cent. 2. Obs. 25. (h) Rond. de Pisc. l. 16. cap. 8. p. 449. (i) M. A. Severini Phoca illusfra-  
tus. p. m. 31.

rundish; I suppose he means the largest of these Globules. Bartholine took notice of two as the most conspicuous, and calls them the spleen. *Dan. Major* mentions 4 or 5. and saith they are so like the substance of the spleen, *ut viderentur totidem splenes esse*; but presently after adds, *& ipse Lien quidem peculiaris ac distinctus in propria sede quoque comparuit, sed ex multis similibus globulis veluti compactus*; if that by this he means any part different from the former globules, his Animal was different from ours, for we could observe no such thing. But as the *Kidneys* here consisted not of one entire substance, but of abundance of distinct Glands, so likewise the Spleen which is a conglomered Glandule, had its various Portions distinct and more separated; so that as it may be said to have three hundred Kidneys, so likewise ten or more Spleens. (k) *Rondeletius* observes that in Dolphins, *Lien in recens natis magnus pro corporis ratione, in adultis parvus & niger.*

These Globules or Spleens were not fastened, as *Major* hints, to the stomach, although placed near it; but to the *Omentum*; as also was the † *Pancreas*, which at its *Basis* † *Tab. 1.* was appended likewise to the *Duodenum*, where its *Ductus* entered and emptyed it self a little below the *Pylorus*, and not into the third stomach, as Mr. *Ray* afferts. *Fig. 6. H.* *Ibid. i.*

The Colour of the *Pancreas* was whitish, as in other Animals. At its *basis* twas thick, and thinner towards the edges, where it seems orbicular or roundish. It was about 2 Inches and  $\frac{1}{2}$  in diameter. One side was flat, the other protuberant. The *ductus Pancreaticus* was pretty large. *Major* saith, that the *Pancreas* he observed, was *longum valde & exorrectum*. But Bartholine describes it to be *triquetrum*.

The Stomach in this fish was very remarkable, consist-

\* Tab. I. ing of 3 Bags. The \* first which was the largest, was  
 Fig. 6. A. about ten Inches in length, and 3 in breadth, resembling a  
 † B. long Pouch or Urinal. Towards the upper † part it em-  
 || C. pties it self into the second || Ventricle which is about .6  
 \* D. inches in length, and 2 and  $\frac{1}{2}$  in breadth. This at the  
 † E. E. \* side near the *fundus* by a long descending narrow pa-  
 sage is emptied into the † third, which is about an Inch  
 broad ; which fending one part downwards, is again re-  
 flected upwards as represented in *Fig. 6. Tab. I.*

The Stomachs are made up of several *Tunicles*; for in the *first*, besides the *Membrana communis* we easily discovered a Muscular Tunicle under it, and in the inside a strong white Nervous one, which very much resembled the inward Pellicle of the Gizard of Fowls. It had abundance of small *ruga* or rather furrows or lines; but at the orifice, where it empties it self into the second ventricle, the *Plicæ* or folds were very large and numerous, that rendered the Passage so strait, that nothing but a fluid *Chymus* could be transmitted.

The inward *Tunicle* of the *second* stomach was a pleasant sight, having large *ruga* length-wayes, from the sides of which at certain small distances issued mutual Protuberances of the same substance. The Colour of the whole was a florid red, very much resembling the branches of red Coral. By scraping with a knife I could express a great deal of a Chymous substance out of it, and pretty easily separate this tunicle from the next. It was about  $\frac{1}{2}$  of an Inch thick, and seemed to be glandulous. The Passage out of this ventricle into the third was very strait, having a sort of Rugous Annular valve, and a Passage about an inch in length before it empties it self into the third ventricle.

The *Tunicles* of the *third* ventricle were much the same with those of the Intestines, and in it nothing is more remarkable than the || *Pylorus* or Passage into the *Duodenum*, the Tunicle there being so contracted and pursed in, that it leaves a Passage only about the bigness of the hollow of a Goose-quill, though outwardly 'tis almost

almost as large as either the Ventricle it self or the Intestine.

Mr. Ray in the stomach of the Porpois he dissected, found a great number of Sand-Eels, Launces, or as call'd by Gesner, *Ammodyteæ*. Dan. Major found in his the Spines of fishes, small *Telline* and particles of other of the Testaceous and Crustaceous kind, and Sand. In ours we observed the Spines of fishes, and 2 or 3 Herrings pretty intire, having only their outward Parts corroded. Likewise in the *Oesophagus* or *Gula* (whose inward Tunicle was almost the same with that of the first stomach) were the bones and spines of several fishes. In the second and third stomach was only a Chymous substance or a *Colligamentum Chylosum livido-albescens*, as Major words it.

Digestion here seems to be performed by a gradual Corrosion first of the outward parts, and so penetrating inwards. But whence the *Menstruum* that performs this Office is transmitted, is difficult to determine. For in the inward Tunicle of the first Stomach there are no Glands feated, that might separate such a liquor; nor are the *Plicæ* or *Rugæ* so considerable, as to contain any great quantity of the Reliques of a former digestion, as to serve for a succeeding ferment; But seem rather a strong close white membrane like the inward Pellicle of the Gizard of fowls, and by this means less capable of any injury from the bones and fragments of shells that are oft contained in it. But as in fowls there is placed a little above the Gizard abundance of Glands, that seern a liquor that serves for the moistening and digesting their hard food, which afterwards is farther comminuated by the grinding of the strong Muscles of that Ventricle; so I am apt to think that in this fish, the *Glandula Maxillares* and those other that are very large and numerous, and are placed about the *fauces* and the neighboring parts, do separate a *saliva* or liquor that may conduce much to this use; unless we may think that that large Glandulous Tunicle in the second stomach may seern a Juice there, that may regurgitate into the first. However since

since all Glandules do make some separation, we may reasonably suppose that this made by this Glandulous tunicle doth serve for the further fermenting the Chymous *magma* transmitted out of the first Ventricle. And nature seems very sollicitous herein, by making the Passages out of one into the other so strait and narrow, that it can't easily be transmitted from one to the other, before it hath undergone its due digestion in each.

Meeting with so many Bones in the *Gula*, it made me think whether possibly after the flesh is corroded from them, it might not vomit them up ; or whether the *Gula* may not in part perform the Office of the stomach, having its inward Tunicle the same. In several fishes there is no *Gula*, but the stomach reaches up to the Throat.

The *Intestines* in this fish were long and small, being eleven times the length of the fish, or about fifty foot. They were almost equally throughout of a bigness, only something larger toward the *Duodenum* and *Anus*. It had no *Cæcum* or *Colon*.

Opening the Extream of the *Rectum* in the inside, I observed a white Pellicle or Skin like the inward Tunicle of the first stomach of this fish. From the *Anus* 'twas about three inches in length ; above this the Intestine was of the same make as elsewhere. About an Inch and  $\frac{1}{2}$  from the *Anus* under this Pellicle I took notice of a pretty large glandulous body that empties it self by several *ductus's* that perforate this Pellicle into the Cavity of the Intestine. The *Ostia* of some of them were pretty large, of others but small, yet would easily admit a bristle into them.

The *Anus* is placed a little below the *Pudendum*, it had its Sphincter Muscle : by the falling of the skin in several *Rugæ* 'twas so closed that no water could get in.

The *Mesentery* in respect of the length of the Intestines was but small, yet had numerous Meseraic vessels branched as in other Brutes. The *Pancreas Afellii* was large,

consisting of abundance of Glands and seated in a somewhat semilunar figure. From the *Pancreas Afellii* running towards the *Receptaculum* we observed several *Vena lactea* pretty large, as likewise some smaller ones coming from the Intestines to the *Pancreas*.

The † Liver is pretty large, not divided into Lobes as <sup>† Tab. 2.</sup> <sup>Fig. 2.</sup> Mr. Ray does affirm, but as in a Humane Body one intire *villus*. It lyes under the Diaphragme, the greatest \* portion of it in the right Hypochondre, and the ‖ lesser in the ‖ left. It is in length 10 inches, in the broadest part about 6 and  $\frac{1}{2}$ , but in the middle where it has the † *Ligamentum c.c. suspensorium*, about 4. It is about 2 inches thick, it weighed 3xxvii.  $\frac{1}{2}$ . Its Colour was of a florid red: Bartholine observed it *pallidus*. The Ramifications of the sanguinary vessels in it are very large and numerous. It had no *vesicula fellea* or Gall-bag, as hath been likewise observed by former Writers. The \* *vena Umbilicalis*, had its <sup>\* d.</sup> passage yet open. The figure of the Liver is best understood by the Cut.

The ‖ Kidneys were a very pleasant sight, consisting of <sup>† Tab. 2.</sup> <sup>Fig. 3.00.</sup> abundance of distinct Glands separated by their proper Membranes from one another, but all included in one common Tunicle as they are in a Bear, a Calf, an Otter and some other Animals.

Each Kidney is in length about 5 Inches about, 2 and  $\frac{1}{2}$  in breadth, and in the thickest part somewhat more than an Inch. Each Gland was about the bigness of a large Pea. At the outward surface for the most part they seemed Sexangular or Pentangular, a double order of them composed the body of the Kidney, and they were in all about 150 or more in each.

Each Gland seemed a distinct \* Kidney; for opening <sup>\* Tab. 2.</sup> <sup>Fig. 4.</sup> several of them I observed a Glandulous or Cortical part which was the outwardmost, and was of a red Colour. Inwards there was a somewhat whiter substance that resembled a *Papilla*, being larger at its basis and rising by degrees

degrees to a point, which I conceive to be made up of the urinary *Tubuli*; which conveys the Urine into the *Pelvis* or Cavity that is in each of them, after 'tis separated by the Cortical part.

<sup>† Tab. 2.</sup> The *Vena + Cava* was large, and did run along upon the Spine between the two Kidneys. Towards the upper part of the Kidneys, it sent forth the *Emulgents*, which are presently ramified, sending a branch to each Gland. Under the *Cava*, as also under the emulgent veins in the Kidneys, the *Arteria Aorta* runs, and is branched accordingly. There was no common *Pelvis* belonging to the Kidneys, but a distinct one in each single Gland. From every Gland there did arise a peculiar *Ureter*, but all at length uniting in one common trunk, it did emerge out of the body of the Kidney towards the lower end, as is represented in the || figure, and afterwards it was inserted into the neck of the bladder.

<sup>\* Tab. 2.</sup> The \* *Glandulae Renales* were of a triangular figure, about an Inch in Diameter. They seemed to consist of a Glandulous membrane, which being folded up into several † *Pliae*, between them there was a small Cavity, which yet was not so large or entire as is in some other Animals.

<sup>|| Tab. 2.</sup> The || *Vesca Urinaria* or Bladder was placed between the Duplicature of the *Peritonæum*, as hath been related. 'Twas of a Conical figure, five Inches long and one broad, a little below its neck, and so arising to a point at its *fundus*; being blown into, it seemed not capable of much extension. Of each side it there ran the two \* *Arteria Umbilicales* as in Quadrupeds. The Ureters were inserted just below the neck, and having opened the Bladder we could easily perceive their *Ostia*, and probe into them from the bladder.

The neck of the bladder is very strait, and runs along the sides of the *Uterus*, and empties its self just at the bottom

bottom or rime of the *Pudendum*, having a protuberant body lying over its Orifice, which *Dan. Major* calls the † *Clitoris*, which is made up of strong fibres almost Cartilaginous.

This leads me to the Examination of the *Organs of Generation* in this Animal, which no less than the other parts did extremely imitate those of Quadrupeds; and even in the whole dissection I could easilier imagine I was cutting up a Dog, a Swine, a Calf or any other terrestrial Brute, than an inhabitant of the watery Element.

Our subject was a Female; and here we shall take notice of the *Vasa preparantia*, *Ovaria*, *Tubi Fallopiani*, the *Uterus*, the *Pudendum* and *Ubera*. I shall begin with the *Uterus*, which was about five inches in length, and had two large \* *Cornua* as in multiparous Animals, each about four inches long. The *Cornua* were fastened to the *Peritoneum*, and had membranous + *Alæ* fastened to the same also. All along the inside of the *Cornua* we observed to run a *Manipulus* of muscular fibres, which expanding themselves at length into two originations, were inserted into the *Peritoneum* at the sides a little below the Diaphragme. Arising also from the *Ovaria* and extremes of the *Tubi Fallopiani*, there were other \* fibres that inserted themselves likewise into the *Peritoneum*. Both these fibres may serve to regulate the motion of these Parts, either for the conveighing the Eggs from the *Ovarium* to the *Tubus*, or the excluding the *fætus* from the *Cornua* into the *Uterus*.

Having opened the *Uterus* I could easily observe a distinction of a *Vagina*, an *Os Uteri internum*, and *fundus*. The *Vagina* was pretty large, had several *Rugæ* or *Plicæ*, but towards the *fundus* these *Plicæ* cross-wayes were so very large and over-folding that they seemed almost wholly to occlude the Passage, or at least to render it very difficult to probe, and made a very strict *Ostium*. This part in the inside had *striae* or *fibrae longitudinales*.

Between its *Plicæ* I did observe a pretty Quantity of a mucous substance contained, as also in them and in part of the *Vagina* several small Glands about the bigness of a Pin's head. These probably may serve for the separating this *mucus*, which I can't imagine to be any thing of a *Colligamentum Genitale*, which *Major* seemed at first to suspect; but rather of the same nature with that found in Cows and other Animals.

<sup>† 00.</sup> At the extreams of the *Cornua* were the † *Tubi Fallopiani* pretty large, when blown up, running in an undulating line the length of the *Ovarium*, and then reflected and terminating in a large *Ostium*, to which as also to the extreams of the *Ovarium* those muscular fibres before described did run, being first colligated into a small node or *Plexus*, and thence expanding themselves.

<sup>‡ P.P.</sup> This I suppose is what *Major* means by his pervious passage from the Testicles to the *Uterus*, though he had forgot to what part of the *Uterus* it did go. The \* *Ovaria* or testicles in our subject were a little more than an Inch in length, about the bigness of a Goose-quill, in Colour somewhat whitish, its surface smooth. *Major* observed it tuberous and unequal. *Bartholine* in one that had a *fætus* in the left *Cornu*, observed the left testicle tumid and as big as a Wall-nut, but the right was longer and slenderer. Opening the *Ovaria* I could observe the rudiments of many Eggs, but very small.

<sup>|| s.s.s.</sup> The *Vasa Præparantia* and || Sanguinary Vessels that came to these parts, were more numerous and larger than in any Animal I have hitherto dissected, but running in a greater plenty to the *Cornua* and *Ovaria* than to the *Uterus* its self. They had frequent *Anastomoses* one with another; and being so very large and thick set, afforded a very pleasant sight; Nature seeming here mighty solicitous and provident for the nourishment, as well as forming the *fætus*; it being a Viviparous Animal; and in one that was pregnant with young that *Bartholine* dissected, he observed a *Placenta*, a *Chorion*, *Amnion* and *Allantois*, a *funiculus Umbilicalis*, in the *fætus* the *Vena* and *Arterie*.

## 28 Phocæna, or the Anatomy of a Porpess.

*Umbilicale*, an *Urachus*, a *Canalis Venosus*, *Canalis Arteriosus* and *foramen Ovale*, all as in the Embryo's of terrestrial Animals or Quadrupeds. Nor are the Organs of Generation in the Males different, they having (as hath been observed by the same Bartholine, as also Mr. Ray, Rondeletius, &c.) a large *Penis* partly sheathed within the body, as in a Bull, *Testiculi*, *Epididymides*, *Vasa Præparantia*, *Deferentia* and *Prostate*, so that there is no doubt here of their manner of Generation, though in other fishes where there is no *Penis*, 'tis more obscure.

It remains that we describe the *Pudendum* and *Ubera*. The outward *Rima* of the former was about six inches in length; dilating it a little we could discover what *Major* calls the *Ale* and *Clitoris*. The latter being a small hard body protuberating over the *Meatus Urinarius*. The Passage into the *Uterus* was straitned by the subsiding of the membranes into several *Ruge*. For the governing the Motion of this part we observed some muscles were appointed, as likewise of each side there were two small bones which did form an *Os Pubis*. *Rondeletius* observed the like in a Dolphin.

The \* *Ubera* were placed of each side the *Pudendum*, \* *iii.* only two in all, each side one. The Teat or *Papilla* was small and retracted inwards, so that without dilating the Part we could only see outwardly a slit or *Rima*. In time of Lactation this part I suppose is much larger and more protuberant, this being but a young one and never (as was supposed) impregnated. (l) *Rondeletius* denies that there are any *Papillæ* conspicuous in a Dolphin, but faith, *Harum vice Alveoli humoris duo sunt, utrinq; unus, è quibus lac fluit, quod ore Catulorum Parentes sectantium excipitur*; and in another, (m) place does quote Aristotle (*Hist. Animal. l. 2. cap. 13.*) for the same Opinion, which yet does seem to me less probable. The Udder or *Ubera* under the skin seemed to be very large, consisting of abun-

(l) *Rond. de Piscib. l. 16. c. 8. p. 462.* (m) *Rond. de Pisc. t. 3.*

dance of small Glands somewhat distinct and separate from one another. Several bloud-Vessels did run to them; and generally I may say of the whole Body, there is scarce any Animal in which the Veins and Arteries are more curiously branched or more numerous than in this. For on the † *Musculus Psoas* their Ramifications were so many and large, and their *Anastomoses* into one another so frequent, that they formed a curious Net-work, and afforded a very pleasant sight. And no less Curiosity we observed in the bloud it self, by examining a small part of it with a good Microscope: for after it was a little dried on the object plate which was of Glass, we found that it had shooted into a most delicate regular figure, being reticular like the texture of the *Omentum*; only that from the sides of the several *Area's*, there were some small branches or shootings of fibres that were not continued..

We come now to the middle *Venter* or the *Thorax*, which was large and capacious, covered with Muscles almost as in Quadrupeds, having two large *Pectoral* Muscles that went to the fore-Fins, as likewise several other Muscles that did serve for the performing its various Motions, and were curiously contrived. There were two *Musculi Intercostales*, *externus* and *internus*.

\* Vid. Tab. 1.  
1. Fig. 2.  
¶ Tab. 2.  
Fig. x.

It had \* thirteen Ribs of each side, five fastened to the *sternum*, two other had Cartilages, but not quite continued to the *sternum* unless by tendons. The Ribs as they descended grew shorter, so that the last was but a little higher than the *Musculus Psoas*. I shall give a fuller account of the Ribs, as also the *Sternum*, when I come to describe the *Skeleton*, and shall only add that the Ribs arising from the Spine do incline towards the *Abdomen*, so that they make a very acute angle with the Spine. The Cartilages or rather bones that go from the first five Ribs to the *sternum*, are reflected upwards towards the head and make with the *Coste* acute angles also. At the upper part of the ¶ *sternum* which was broad and some

somewhat depressed there were inserted two large and thick Muscles that ran towards the *Maxilla*. These probably by contracting may serve to draw the *Sternum* upwards, as the *Musculi recti* which are inserted into the bones of the *Sternum*, downwards, and so promote Respiration ; which likewise is farthered by those other Muscles, which are also common with this fish and other Quadrupeds that are destined to that office, and chiefly by the

\* *Diaphragme*, which in this Animal was very remarkable ; for it had no *Aponeurosis* or Membranous tendon in the middle, but was muscular throughout. It was fastened to the *Sternum*, the Cartilages and the other Ribs downwards. It had a deep hollow in the middle, as it were pulled into the *Thorax*, which was occasioned by having the *Pericardium* fastened to it which did draw it in. The Tendons of this Muscle were very curious : for besides those large ones that did run down by the Spine, there were several *Manipuli* of other tendons that went over the *Musculus Psoas*, and even in the middle or body of the Diaphragme there did appear abundance of tendons running over the muscular fibres, as where the *Vena Cava* perforates it, and in other places, though not very regularly or in any set order, but more confusedly. These tendons appeared of both sides the Diaphragme.

*Dan. Major* mentioneth a *Mediastinum* but we could observe none, but it was supplyed by the joyning of the *Pericardium* to the *Sternum* ; twas fastened also to the Diaphragme as in men, and did draw it upwards. The *Pericardium* was very large ; what water was in it I do not well remember ; *Bartholine* observed it to be cruentous, which I suppose was from the dissection.

The † *Heart* was long, of a triangular figure, about four Inches from the basis to the Cone, and as many at the largest part of the basis, about an Inch and  $\frac{1}{2}$  thick.

It had two large Ventrices and as many Auricles. Towards the Cone the Ventrices seemed a little divided. The valves of the Ventrices and of the *Arteria Pulmonalis* and *Aorta* were not different from those in Quadrupeds, but the *Carneæ Columnæ* in the left Ventricle were larger and more numerous and curiously interwoven lattice-wise.

The *foramen ovale* was closed and not open; where it had been, we could perceive by its thinness and transparency. We did not think of it then to look for the *Canalis Arteriosus*, but probably its passage may be likewise shut, as is also the *foramen ovale* in a Beaver and an Otter, as it hath been observed by some at (n) *Paris*, though 'tis delivered by others that in these Amphibious Animals 'tis kept open, that they may be the better able to keep under water, the Circulation of the bloud being continued by this means without being transmitted into the lungs as it is in the Embryo's of Quadrupeds *in Utero*. The same is affirmed by (o) *Severinus* concerning Ducks and Geese, and thence he gives a reasoun why they are not suffocated by diving under water so long, or strangled when holden by the neck in ones hand.

\* Tab. I. Fig. 3. cc. The \* *Lungs* had only two large lobes, each of them about ten inches long and about 4 and  $\frac{1}{2}$  broad, and two inches thick when not extended, and did in one part adhere to the Diaphragme a little below the entrance of the *Bronchia*. It had several *Glandula* containing a Steatomatus matter. The Lungs were encompassed with a strong membrane, which being taken off, the minute ramifications of the Sanguinary Vessels were very pleasant to behold. The *Parenchyma* of the Lungs was the same with that of Quadrupeds, and when blown up were very large; which makes me suspect the truth of that assertion of (p) *Rondeletius* concerning the

(n) *Mémoires pour servir à l'Hist. Nat. des Animaux.* (o) *Phoca illustrat.* p. 37. (p) *Rond. de Pisc.* l. 16, c. 8.

lungs in a Dolphin that they are *densiore substantia quam in terrestribus, crassitudine & colore Epar referunt*. And the reason he gives wherefore it should be so, seems not satisfactory.

The *Windpipe* or *Arteria aspera* was very short, as it must needs be, this fish having no neck. The *Larynx* was of a singular figure and very remarkable, which I shall describe with the parts belonging to the head. But before I leave the *Thorax* I must take notice of a seeming + Glandulous body that did lye of each side the *Spine* about two inches broad and the length of ten or eleven Ribs. It was continued likewise a little over some of the Sanguinary Vessels that went to the head. It was a curious contexture of sanguinary vessels variously contorted and winding, emerging from the *Medulla Spinalis* at the holes where the Nerves come out between the Ribs, and as we afterwards observed the same substance likewise for a good thickness covered the *Medulla Spinalis* throughout. In the *Thorax* in some places twas above a quarter of an Inch thick, but every where it appeared of the same Contexture, a winding and convolution of bloud-Vessels. What this part may be, is more difficult to assign, since it does not usually occur in the dissection of other Animals, and has not been taken notice of, as I know of, by any in this. But whether it may be that the heat of so much bloud contained in so many vessels may serve for the invigorating the Animal Spirits in the *Medulla Spinalis*, or whether it may not be a Glandulous body and so serve for the draining of the ferosities of the bloud and thereby render it fitter for generating Spirits, or what other uses it may have, is to me yet obscure. Formerly dissecting a fish which *Hippolytus Salvianus* calls *Lupus*, under the *Cranium* I observed a much like substance enveloping the Brain, and was of a good thickness; the *Pia Mater* in Colour and luster exactly imitating leaf Gold.

+ Tab. 2.  
Fig. 7.

\* Tab. 1.  
Fig. 2. c. Above the sternum was placed the \* *Thymus*, which was  
a large Conglomerated Glandule. We observed likewise  
the *Glandula Maxillares*, *Glandulae Thyroideæ* and some  
others. At the root of the tongue there were several  
Tab. 1. small || *foramina*'s which we supposed to be the *Ostia* of  
ig. 3. aa. salivatory *Ductus*'s; We could probe them with a bristle.  
But where the *ductus salivalis* of the Maxillary Gland was  
inserted, either our inadvertency or want of leisure made  
us neglect to examine.

The *Rictus of the Mouth* is but small, yet the passage  
into the *Gula* is pretty large and open. The *Teeth* are so  
placed that those of one Jaw are received into the  
distances of the other. There are twenty four of each side  
either *Maxilla*, ninety six in all. They are but small, and all  
of the same form, somewhat acute. Wherefore (q) *Jon-  
ston* is mistaken who saith, they have *dentes obtusos Homini-  
molaribus similes*. These teeth are somewhat move-  
able as is observed by *Dan. Major*, since they are not  
fastened in distinct sockets or Cells as is usual in other  
Animals, but only by a strong membrane or Cartilage,  
there being one common furrow in each Jaw into which  
the Extreams of all of them are received: These teeth  
are so small and short that they seem unfit either for  
mastication or fight, but only to detain their Prey till such  
time as they can conveniently swallow it whole. (r) *Rond-  
deletius* does observe that in fishes that do suck, the teeth  
are at first soft and covered, that they might not injure the  
Breast. But Nature here does seem farther provident,  
in that just before it has left a space void of teeth, and  
the neighbouring teeth that are next it are also shorter  
than the rest.

(q) *Jonst. Hist. N. de Pisc. l. 5. p. m. 221.* (r) *Rond. de Pisc.  
l. 3. c. 7.*

The \* Tongue was very curious, of a muscular or fleshy <sup>† Tab. 1.</sup> substance, a little indented at the edges, about 2 Inches <sup>Fig. 3. A.</sup> and  $\frac{1}{2}$  long, and about 1 and  $\frac{1}{4}$  broad and pretty thick, but so firmly fastened all along to the bottom of the Mouth, not to the Palate as *Major* and *Bartholine* say, that it can't exert or thrust its self out beyond the Verge or Limits of the Mouth. And herein a Porpess differs from a Dolphin: for as *Rondeletius* does observe, *Delphinis lingua est mobilis, que modo exeri, modo condit potest, non hincens Palato*; and the same is asserted likewise by *Pliny, Solinus* and others: and expressly in (f) *Rondeletius, Delphin lingua longiore habet Marsuino, Marsuinus eo latior*: and therefore in his Figure he represents it hanging out. The use of the Tongue here I conceive is not for forming a voice; for that *grunniens* they sometimes make may be rather formed in the parts of the *fistula*; nor probably for tasting, since they swallow their prey whole: But rather when young to help the motion of sucking, and when elder that of deglutition.

At the Root of the Tongue was the || *Larynx* which <sup>¶ Tab. 1.</sup> was very long and protuberating, having its extremity an- <sup>Fig. 3. B.</sup> swering and somewhat inserted into the bottom of the *fistula*, like a Ducks bill: *Bartholin* saith that *Collum Anserinum refert*; Mr. *Ray* makes it to resemble the Neck of an old fashioned Ewer, as *Cassinius* likens that of a Hog to a *Gutturinum*. The make of it was very curious and different from other Animals, chiefly in the length of the *Cartilago Arytainoides*, the *Epiglottis*, and the Structure of the *Scutiformis* or *Thyroides*. The \* *Cartilago Annularis*, or *Cri-* <sup>\* Tab. 1.</sup> *coides* was much the same as in other Brutes. But the <sup>Fig. 5. A.</sup> *† scutiformis* here was not one entire Cartilage but two <sup>† B.B.</sup> separated from one another, by the interposition of the Basis of the *Epiglottis*, running up the sides of it pretty broad, and sending down a narrower process to the Ex-

(f) *Rend. de Pisc. l. 3. cap. 9.*

¶ c.c.

tream of the *Annularis*. The *Cartilago Arytaenoides*, (t) *Casterius* saith, is difficult to describe, *præsertim cum pro diversitate subjectorum, eam quoq; variari ut plurimum contingat*; but in none, as hitherto I have observed, more than in this. For 'tis protuberating beyond the *Annularis*, above an Inch and  $\frac{1}{4}$ . 'Tis two distinct Cartilages, joyned together by a strong membrane. At the end it has † thick lips, and in the middle a † *Rimula* which (u) *Vesalius* makes to be the *Glottis*, though those that make here five Cartilages do reckon this to make up the number. The \* *Epiglottis* was no less remarkable, and its structure as different. 'Twas about two Inches in length, large at its *basis*, and fastened to the narrow part of the *Annularis*. As it ascends it becomes narrower, having its sides more closed together. At its extream it hath a large thick semicircular lip which serves to cover the *Rimula* or *Glottis*, though not protuberating much over it as in other Animals. The various Muscles that did serve to govern the Motion of these Cartilages were no less admirable and curiously contrived. But in this single subject we had not leasure to go through with them, being more intent upon the *Viscera*. We observed the *Glandula Thyroideæ* to be pretty large.

† Tab. 1.  
Fig. 2. B.

The † *Os Hyoides* was very large and curious: and although *Dan. Major* hath mentioned an *Os Hyoideum reduplicatum*, yet I find he hath committed a double mistake concerning it; for it consisting as it were of two parts, the one he makes, I know not how, the *Os sterni*, the other the *Clavicule*. The first, which in his figure he gives us for the *Os sterni*, and said consisted of three Bones, in ours it was but one, but was of the figure he hath well expressed it in, viz. triangular or having 3 Processes, 2 whereof were two inches long, and in some parts about  $\frac{1}{4}$  of an Inch broad, and had their extremities distant from one another about three Inches. The third Process was

(t) *Jul. Casterius Placentia de Vociis Auditivisq; organis, l. 1 c. 1:2*  
(u) *And. Vesalius Corp. human. fabrica. l. 1. c. 38.*

much shorter, but from it there did arise two large Cartilages, which after a little while being reflected, had joyned to them two narrow Bones, which were three inches long and bended like Ribs. These last I suppose *Major* took for the *Claviculae*, although (w) *Rondeletius* saith that Dolphins have no *Claviculae*, nor did I meet with any in this fish.

In the lower *Maxilla* there was a large Cavity filled with a substance that resembled a Glandulous body or rather fat, different from that of the rest of the body, and consisting of several little bodies orderly placed together, more shining and less fluid. Since the dissection this part hath made me think of the *Sperma Ceti*, which is said to be found in the head of a sort of *Burmudus* Whale; but since by other Relations 'tis readred dubious whether there might not from other parts likewise be obtained the same tallowy fat we call *Sperma Ceti*, or at least being ignorant in what particular part in the head it is, that this does lye, it has stifled a conjecture, whether possibly this might not be something analogous to that in Whales, since a Porpoise is of the Cetaceous Kind and hath so many parts the same and common to both, as especially what we shall describe next, the *Spiraculum*, *Fistula* or *Spout*.

The Pipe or *Spout* in this fish is its Nostrils, and serves for the conveyance of Air in Respiration, as the *Nares* in other Animals: But hath also this additional use, for the spouting out of water, which when with its prey it receives in a great Quantity not convenient to be swallowed, and having no Gills, it may be sent out this way without hazard of losing what it had taken. Its contrivance is very curious, arising from the Palate with a single *foramen*, but when it perforates the ||*Cranium*, 'tis divided by an offeous *septum* into two, but above

Tab. 2.  
Fig. x. aa.

<sup>† Tab. 2.</sup>  
<sup>fig. 9. A.</sup>

it is united again into one, making in the skin a kind of † semilunar slit or *foramen*. At the lower Orifice as also above the *Cranium* it had several strong and fair muscles, which doubtless served for the regulating its motions in spouting out the water. In the inside of the *fistula* below the *septum* there were abundance of holes or *Papille* which I took for the Orifices of Glands, and Mr. *Ray* does observe that if you do press them, there would start out a certain glutinous liquor: Which *Mucus* may serve for the lubricating the insides of the *fistula*, as also defending them from the acrimony of the salt water, and may be likewise a recrement cast off from the blood as is the snot in other Animals. Over the two hollows of

<sup>\* Tab. 2.</sup>  
<sup>Fig. 8. CC.</sup>

the *fistula* just above the *Cranium* there lye two \* protuberating bodies like an *Epiglottis* or Valves, whieh as Mr. *Ray* does likewise observe, serve to stop the Pipe that no water gets in there without the fishes will. Near this there are placed four Bags or two pair of them:

<sup>¶ Tab. 2.</sup>  
<sup>Fig. 8. EB.</sup>  
and fig. 8.  
D.D.

The first || pair which is the largest, lyes upon the middle of the *Rostrum* or snout, it hath at first one common \* *foramen*, then subdivides into two cells, each of which will contain a large Nutmeg; they are covered on the inside with a black skin, and seem to be made up of a gristly substance, formed into several *Plicæ* or folds lengthways, something resembling the *os spongiosum* in some other Animals, and possibly may have something of the same use, at least may serve for the forming the noise they make against storms

<sup>† Fig. 8. FF.</sup>

and bad weather. The two other or † second pair are placed higher and more to the sides of the *Rostrum*; their cavity is not so large, but in it is contained a considerable || Glandule about the bigness of a Filbird, which may separate a liquor serving to some of the uses before described. By having this membrane over it, it in part resembled the *Tonsils*. Mr. *Ray* mentioneth a third pair tending towards the brain, having a long but narrow passage, for the use as he conjectured of smelling; but opening the Brain, neither of us could find either Olfactory Nerves or *Processus Mamillares*. This last pair I did

¶ G.G.

did not take notice of my self, though I do not deny but that they may be there.

Rondeletius denies that fishes have Eye-lids, where he saith, (x) *Palpebris vero omnes (sc. Pisces) carent, quod commode nictare in Aqua non possunt, sed duriores Oculi facti, ne facile ab Aque falsedine, que arrodit, ledentur.* And elsewhere, *Palpebrarum defectum Cornea duritie pensavit Natura, que undiq; Oculum ambit, non ex adverso Papille tantum ut in hominibus.* Which though true in several fishes, yet holds not good in this, for here we must grant *Palpebrae* or Eye-lids. Their aperture was but small, and on the insides of the upper Eye-lid we observed Steno's *ductus*'s very fair, and did put in Bristles into several of them, that did run into the *Glandula innomina-ta*, from whence they did arise, which Gland was very large. Jonston out of *Cardan* affirms that a Porpess sometimes weeps; if there be a Passion, there wants not matter here for tears. However this humour may serve for the washing off the Brine of the Sea water from fretting the Eye, which in this hot Animal perhaps may be tenderer than in other fishes, which have for this use a proper Tuncle, which is a continuation of the *Cutis* that covers the *Cornea* and is transparent, as is plain in *Whiting*s, &c. The Orbit of the Eye was not so perfect or composed of bones as in other Animals, but at the lower part it had only a very thin small bone. The Bulk of the Eye in proportion to the body was but small, being not so big as in a Sheep. It had all the Muscles very fair as in a Man, and likewise the *Musculus septimus* or *suspensorius* that is proper to Brutes, and which did inclose the Optick Nerve. The use of this in Brutes that are *prono Capite*, is thought to be, to suspend the Bulk of the Eye that it receives no injury from the declivity of the head; but there being not that danger here, Nature that does nothing in vain, must have some other intendments, and probably

(x) *Rond. de Pisc. l. 3. c. 2. p. 47.*

it may be, that by its equal contraction of the *Sclerotis* to which 'tis fastened; it renders the Ball of the Eye more or less spherical, and so fitter for vision. The *Tunica sclerotica* was much more dense and hard than in other Animals. The *Choroides* was party-coloured, a mixture of Blue and Green, which is not in the *Porcus terrestris*. The *Pupil* was Oval which is not so common in other fishes. The *Crystalline Humor* was of a Spherical figure, but seemed to be a little more convex in the anterior than posterior part. The *Optick Nerve* was not inserted so laterally as in Quadrupeds, but rather in *Axe Oculi*.

The *Brain* in this fish was large, it weighed  $\text{xxvi} \frac{1}{2}$  and resembled much more that of Quadrupeds than fishes. Its figure was somewhat short, but what it wanted in length, it had in breadth. The *Cerebrum* was separated from the *Cerebellum* by an *os triangulare*, as in Dogs and some other Animals. The Brain was divided into two Hemispheres, though *Rondeletius* does say that in a Dolphin 'tis not divided into *dextrum* & *sinistrum*. It had its *Anfractus*, but not so deep as in some. Its surface was curiously ramified with bloud-vessels. There were the *sinus's* and *dura* and *pia Mater*, the *substantia Corticalis* & *Medullaris*; Nor in any thing was it more different from the usual make and conformation of it in other Animals than in the defect of the Olfactory Nerves and *Processus Mamillares*, which is likewise taken notice of by Mr. *Ray*. But for all this (y) *Rondeletius* thinks they smell, where he faith, *In Delphinis nec foramen (Narium) nec meatus ullus est, etiam si sagacissime odorentur, ut testis est Aristot. (Hist. Anim. c. 8.) & Experientia ipsa confirmat.* The Optick Nerves were large, and did seem to be united as in men, and not so plainly to decussate each other as is usual in some fishes. We observed the *Nervi Oculorum motorii, Pathetici, &c.* in all about eight or nine Pair. The *Infundibulum* and *Glandula Pituitaria* were

(y) *Rondel. de Pisc. l. 3. cap. 8. p. 57.*

very fair. How the *Glandula Pinealis* was, we did not well observe, it being most decayed, as we supposed by keeping. But the *Tunica Choroides* did spread its self in both ventricles, and being united on the *Medulla Oblongata*, did run down the length of above half an Inch; 'twas the breadth of a Goose-quill, and did seem thicker than usual, and was a curious contexture of bloud-vessels. As for the inward parts of the Brain we did observe all as delineated in Dr. *Willis's* figures; and though Mr. *Ray* does say that he did not observe in that which he dissected, those Protuberances call'd *Nates* and *Testes*, yet we saw them both very fair, but the *Testes* were much larger than the *Nates*. The *substantia Medullaris* in the *Cerebellum* was very Curious and ramified like Ferne. From the *Medulla Spinalis* upwards the *Cerebellum* was flatter and less protuberant than in other Animals. The *Medulla Spinalis* was covered, as is related before, with a thick Glandulous, or at least vascular Tunicle, it sends forth abundance of Nerves, and at length makes a large *Cauda Equina*.

Mr. *Ray* saith that the largeness of the Brain in this fish, and the Correspondence of it to that of a Man's, argues this Creature to be of a more than ordinary Wit and Capacity, and makes to seem less fabulous and improbable those antient stories related by *Herodotus* concerning *Arion*, by (a) *Pliny* the Elder concerning a Dolphin enamoured of a Boy, whom he was wont to carry across a Bay of the Sea from *Baiae* to *Puteoli* to School, and by (b) *Pliny* the younger of another enamoured of a Boy at *Hippo* in *Africa*, whom he was wont to carry on his back in like manner. (c) *Pausanias* has a like story, and (d) *Plutarch* relates how *Eulius* was saved by Dolphins in like manner as *Arion*. *Dio Chrysostom* not only relates the story of *Arion*, but adds that the Mariners were executed, and *Jo. Scaliger* in *Animad.*

(a) *Plin. Hist. Nat. lib. 9. c. 8.* (b) *Plin. Epist. 33. lib. 9.*  
) *Pausan. in Laconic.* (d) *Plutarch. in Sympos.*

in Euseb. p. 84. does assert it to be no fable but a true History. But (f) A. Gellius makes it to be an Imposture of Herodotus, as also does (g) Strabo. And considering the Lubricity of the skin of this fish, the protuberancy of its back, and its undulating not horizontal motion in swimming, it does confirm their Censure,

—sed quid non Gracia mendax  
Audet in Historia?

However Severinus (in his *Phoca illustratus*, p. m. 27.) relates out of Fran. Lopes (*Hift. Indicae General. cap. 31.*) that a *Manatus* or sort of Sea-calf was kept in a Lake in Hispaniola that was grown very tame, and did use to carry on his back from one side of the Lake to the other ten boyes at once.

Aristotle (j) grants that Dolphins hear, but faith, they have no *Ears*; (k) Pliny writes the same, but we rather concur with Rondeletius, (l) sed ista ex dissectione falsa apparent; meatus enim audiendi in Delphino hujusmodi comperiuntur, quales ad sonos percipiendos idonei esse posse sunt. 'Tis true they have no *Auricula*, which though they would advantage their hearing, yet would injure their swimming; and the *Porus Auditorius* is extream minute and small, for if larger, the water getting into it, might likewise prove an Inconvenience. But the structure of the Organ of the Ear, or the *Os \* Petrosum* in this Animal is very remarkable, and different from any that I know yet described. 'Tis seated in a large cavity of the *Cranium*, but not locked in by sutures or the joyning of the other Bones, but fastened chiefly by the intervention of Muscles: 'Tis the hardest bone in the body, its colour white, its figure irregular, and difficult to be described

\* Tab. 2.  
Fig. 12.

(f) A. Gellius Noſt. Attic. l. 16. c. 19. (g) Strabo l. 13.  
(i) Arist. Hift. Anim. l. 1.c. 11. (k) Pliny Hift. Nat. l. 11.c. 37.  
(l) Rond. de Pisc. l. 3. c. 3. p. 50.

by words. As fixed in the Cranium you may observe in its surface a winding + Sinus or furrow that leads to the <sup>Fig. 12. 4.</sup> <sup>Tab. 2.</sup> <sup>||</sup> Tympanum that is placed a little within the bone. At <sup>Fig. 13. C.</sup> <sup>|| B.</sup> the Processus Mamillaris it has three large Protuberances or Processus, and at its opposite extream inwards a hollow, which is better perceived when the bone is taken out; for then you may observe a large \* Cavity that leads in- <sup>Fig. 13.C.</sup> to the Hollows of the Ear-bone, besides several other foramina's that afford passages to the Nerves or some small muscles; so that the Ear here is not a continued and entire bone forming a Cavity within its self, but at its inward part where joyned to the Cranium 'tis perfectly divided and seems to make two bones, being joyned together only at its anterior part, where is the Tympanum. Sawing it there asunder, one part of the bone somewhat resembled a sort of *Concha Veneris*, and at one place was very + thick and solid, the other was a thinner Lamina <sup>Fig. 13.</sup> <sup>dd.</sup> making the Cayity; the other part of the bone was likewise very thick, having three large Protuberances, the middlemost which was opposite to the Tympanum at its outside, had a large <sup>||</sup> foramen, which afterwards divided <sup>|| B.</sup> into others; here we supposed the Auditory Nerve entered. This bone by its winding somewhat resembled a \* *Cochlea*, and at its inside opposite to the Tympanum <sup>\* a.c.</sup> there went several fibres or small minute Muscles, which by their contraction and keeping this membrane tense, might perform their Office and supply their defect, Nature never being wanting of means for the attaining her end, though not always making use of the same. So possibly it is that since there is so open a Cavity at its posterior part, it has made the bones there so thick and dense, that the sound may be more intense from the greater Collision of the Air on so solid a body. Where there were a design of giving the Comparative Anatomy of the Organ of this Sense in various Animals, this may well deserve a stricter inquiry into. *Dan. Major* hath given two Figures of this bone, but without its explanation.

There remains the *Osteology*, or to give an account of the *Bones* and *Skeleton* of this fish, and in general I shall observe of them, that as the Muscles and most of the *Viscera* very much imitated the structure of those of Quadrupeds, so likewise the Bones here came very near them, as to their solidity, colour and structure, and in all excepting what differences the necessity of the figure of this fish occasioned. I shall begin with those of the Head, where I shall take notice of the *Cranium*, the *Rostrum* and lower Jaw or *Maxilla*. For where (m) Rondeletius saith, a *Phocena* has no *Rostrum*, it must be understood of its appearing so whil'st the flesh and fat is on; whose great bulk does render it obtuse and curt: but when 'tis taken off it appears otherwise; for then the upper Jaw or *Rostrum* from the *Cranium* to its Extremity is six inches long, but in a Dolphin much longer. At the beginning

\* Tab. 2.  
Fig. x. <sup>aa.</sup> of this bone just below the *Cranium* is the *Fistula* or \* *Nares*, which as is related before was divided by an osseous *Septum* into two Cavities. The *fistula* was formed partly by that bone Columbus calls the *Vomer*, which arising from the Palate does send a thin *Lamina* up the *Cranium*, and is continued on the *os frontis* to the great Protuberance in the middle there, forming three † protuberances on the *os frontis* above the *fistula*. The other part of the *fistula* is formed by two bones, pretty large at their basis and rising above the surface of the *Rostrum*, and sending down two ‖ Pyramidal processes about two inches long, between the inward bones of the *Rostrum*. For the *Rostrum* was composed of four Bones, the two \* outward-most were a continuation of those of the *Cranium* having two processes, the first that composed part of the ‖ *os Zygomaticum*, and another about two inches lower; then it grew narrower, not being almost half the breadth as it was before. To be too nice and scrupulous in the description of all the bones here might seem tedious and

troublesome ; I shall therefore take notice only of the most remarkable things : as whereas the *Cranium* was five inches in breadth, 'twas only three in length. 'Twas protuberant much above the † *Rostrum*. The sutures † at a chiefly were those they call *Harmoniae*, by a simple line, but the *Lambdoidea* was somewhat indented.

By reason of the different bones that composed the *Cranium* the sutures likewise were differently placed. But I observed that where I might expect the *sutura Coronalis* there was a large eminency of the \* bones, and just \* ε. in the middle of the forehead over the *fistula* there was a large Protuberancy jutting out. Other particularities I might take notice of here as also in the Palate : but passing them aside, within the *Cranium* we found an *os triangulare*, but somewhat different from that in Dogs, having at its extremity a rising up like a *Crista Galli*. From this bone the length of the upper part of the *Cranium* answering to the *sinus Longitudinalis*, there was a pretty deep Protuberancy, that as the *os triangulare* separated the *Cerebrum* and *Cerebellum*, this did the two Hemispheres of the Brain. I observed no *Crista Galli* here, and the *os Cribriforme* was not perforated, as is usual. The Anterior Processes of the *sella Turcica* were wanting, though there were somewhat of the Posterior ; but there were not those *foramina*'s from it as in a mans, and other Brutes ; though it had an *Infundibulum* and *Glandula Pituitaria*. That part of the Ear-bone or *os Petrosum* which I said resembled a \* *Cochlea* from its winding, \* Tab. 2. Fig. 13. ad. does on the inside here appear very well, and that passage for the auditory nerve is very fair. The Cavity for this bone is large, but a great part of it filled with Muscles.

*Dan. Major* has given a figure of the *Cranium*, but in some particulars he does not sufficiently express the life ; but that which he gives of part of the lower *Maxilla* is more exact. It was a || thin but solid bone ; its *Lamina* on || Tab. 2. Fig. x. K. the inside was not continued home to the Articulation, but leaving a large space, that led into a considerable Cavity

vity within, which was filled with a particular sort of fatty substance, as is before hinted. The length of the lower *Maxilla* or Jaw was about 7 Inches and  $\frac{1}{2}$  at the broadest place, towards the articulation two Inches; and in the narrowest towards the extream, not above an Inch. It consisted of two bones that were joyned together at the *Mentum*.

We shall next describe the *Spine* which consisted of sixty *Vertebrae* from the † *Atlas* to the *apex* of the Tayle. *Dan. Major* numbred but fifty four, the first or the *Atlas* to which the *Cranium* was fastened, was very large, having two transverse Processes that were long, and two others just below them that were much shorter and lesser. It had likewise two Spinal Processes: The hindermost that was much the greatest answering to the Spinal Processes of the other *Vertebrae*, and a smaller jutting something towards the head. This hindermost Spinal Process, at its extremity had a division, that it might receive the Spinal process of the next *Vertebra*; which seem providently contrived, that so it might not hinder the erection or flection backwards of the head. Under this first *Vertebra* there was the appearance of two other small ones, which may be reckoned those of the Neck. The *Vertebrae* of the *Thorax*, as also the *Abdomen*, had transverse, spinal and oblique processes; but those of the upper *Vertebrae* were smaller than of the lower, all being largest about the beginning of the *Abdomen*. In the first six *Vertebrae* the Posterior Spinal process, upon flection of the body, is received into the Cavity of the Anterior; but in the other *Vertebrae* that of the Anterior into the Posterior; but the seventh *Vertebra* seems dubious between both. So the transverse or lateral processes of the *Vertebrae* of the *Thorax* are oblique descending. The four first of the *Abdomen* do lye at right angles with the *Vertebrae*; but the remaining are obliquely ascending. The oblique Processes in the first *Vertebrae* of the *Thorax* seem to be *Epiphyses* of the transverse, but as they do descend, they

they grow gradually higher and higher on the Spinal, forming two cheeks, into which is received the back of the anterior spinal process.

Besides these processes already mentioned below the *Abdomen* and opposite to the spinal processes, I find \* others not arising from the *vertebræ* themselves, but <sup>\* Fig. 1.</sup> <sup>P P.</sup> that Cartilaginous body that joyns the *vertebræ* together. They consist of two small bones joyned together at the end, but distant at the bases, so occasioning a hollow, through which there runs abundance of blood-vessels; as the *Medulla Spinalis* does in the Cavity of the Spinal processes. These processes, as do all the other, grow lesser as they approach the Tayle till they are quite obliterated. Where the Tayle or hinder-fins are fastened, the *vertebræ* do proportionably lessen and do grow broader and less round. The *vertebræ* are joyned together by the intervention of a bony Cartilaginous body that consists of a double *Lamina*, containing, in a Cavity in the Middle, a gellied substance. This is an excellent contrivance for the flection of the body, for otherwise the *vertebræ* themselves are too rigid for such a motion.

I have before mentioned that there were thirteen † Ribs, that only five were fastened to the *Sternum*, that <sup>† sss.</sup> the sixth and seventh had Cartilages but not continued to the *sternum*; how that they rose obliquely from the Spine, &c. I shall add that the first five Ribs, that were continued to the Spine, had a double origination; the first to the extremity of the transverse process of a hinder *vertebra*, and the second to the basis of a former. The other Ribs were only fastened to the extream of the transverse or Lateral Processes. The thirteenth or last Rib did arise only with a Cartilaginous Origination, and afterwards became long. And whereas the *os Pectoris* or *Sternum*, and that which continues the Ribs in other Animals to the *sternum*, is usually Cartilages, here 'twas all perfect bones.

\* Tab. 1.  
Fig. 2. d.

The || *Sternum* here was one entire bone, four Inches and  $\frac{1}{2}$  long ; about three and  $\frac{1}{2}$  broad at the upper end, but towards the lower part, it was but one Inch. It had no *Cartilago ensiformis* or *scutiformis*, that I observed. At the broad end 'twas somewhat depressed, and in the middle had a perforation ; both which I suppose were for the better adhesion of Muscles. *Dan. Major* not taking notice of this, describes part of the *os Hyoides* for the *os Sterni* as is mentioned before.

\* Tab. 2.  
Fig. 11. A.  
† E.  
|| c.  
\* d. d.

|| e.e.  
† f.f.

'Tis before remarked how much the *Fore-fins* resembled an Arm, consisting of Bones and Cartilages curiously articulated together. The \* *Humeri* or *Brachii* was about one Inch and  $\frac{3}{4}$  long. The † *Radius* and || *Ulna* about two Inches, but the *Radius* towards the Carpe was an Inch broad. The \* *Carpus* seemed to consist of five pretty large roundish bones, joyned by Cartilages, and two oblong ones that seemed the *Epiphyses* of the *Radius* and *Ulna*. After this 'twas divided into five fingers, but the Thumb and little finger were very short. The fore-finger was the longest, then the middle-finger, and so the third. These three last mentioned fingers had the bones of the || *Metacarpus*. The fore-finger had five † *Articuli* or Joyns, and so the middle finger ; but the third had but three. Between the bones of each *Articulus* there were very large Cartilages that seemed double, one belonging to the extremes of each bone. *Major* hath given a figure of the whole Arm or Fin ; (n) *Bartholine* hath a like picture of the hand of a Syren, and such an one there is likewise in *Septalius* his *Museum* ; as there is also kept in the Anatomy School at Oxon.

\* Tab. 2.  
Fig. 2. Q.

The \* *Scapula* to which was fastened the *os Humeri*, was pretty large, much of the usual figure of that of

## 48 Phocæna, or the Anatomy of a Porpois.

Whales which is commonly made use of for Signs. It wanted the Spine and had two large || processes, <sup>Fig. x.</sup> rr which is best understood by the Cut, as 'tis well represented by *Dan. Major*.

As to the *Myology* we have little to add, not having had leasure to prosecute that in this subject ; however I shall observe that the *Musculus Psois*, was very large, lying on each side the Spine, and having one extream inferted in the *Thorax* and the other by strong tendons in the Tayle. Likewise on the Back between the Spinal and transverse Processes there did lye two very thick Muscles, rising from the *os Occipitis* and terminating with a multitude of tendons in the Tayle, but sending tendons all along to the Spinal *vertebrae*, &c. These Muscles doubtless contribute very much to their swift and nimble motion, which as it hath been observed by many, so is elegantly expressed by *Ovid*, where he faith,

Undiq; dant saltus, multaq; aspergine rorant,  
Emerguntq; iterum, redeuntq; sub aquora rursus,  
Inq; Chori ludunt speciem, lasciviq; jactant  
Corpora, & acceptum patulis mare naribus efflant.

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F I N I S.

I am publish'd to business and his bounde or fatione of hope  
will make you great and happy my world -

At a Newgate Library Company of the Royal Society  
Decr 11<sup>th</sup> 1880.

Rutherford T. had a Book intituled A New Dis-  
covery of a Picture for Setting Books 80c  
Written by John Galt Doctor of Physick, and  
Fellow of the Royal Society, & Fellow of the Philo-  
sophical Society of London.

C. Morris

---

*At a Meeting of the Council of the Royal Society,  
Decemb. 8<sup>th</sup> 1680.*

O Rdered, That a Book intituled *A New Digestor, or Engine for softning Bones, &c.* Written by Denys Papin Doctor of Physick, and Fellow of this Society, be Printed and Published.

*Chr. Wren.*

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